PROVINCIAL ADMINISTRATION OF KWAZULU-NATAL
DEPARTMENT OF PUBLIC WORKS

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

BILLS OF QUANTITIES

with GCC for Construction Works - Second Edition 2010

CONTRACTUAL SECTION

ONE VOLUME APPROACH
SECTION 2

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ENGINEER/PRINCIPAL AGENT
Sakhisizwe Architects
33 Adelaide Tambo Drive
Durban North
KwaZulu-Natal
4153
031 - 563 3424 - Tel Number
031 - 563 3518 - Fax Number
siyathemba@sakhisizwearchitects.co.za

QUANTITY SURVEYORS
LDM Quantity Surveyors DBN (Pty) Ltd
P.O. Box 19233
Dormerton
4015

031 - 207 1340 - Tel Number
031 - 209 9441 - Tel Number
rntlauzana@ldm.co.za

EMPLOYER:
Head: Public Works
KZN Department of Public Works
Private Bag X 9041
PIETERMARITZBURG
3200
Tel Number: 033 - 897 1300
Fax Number: 033 - 897 1399

REGION:
Regional Manager: Southern Region
KZN Department of Public Works
X9041
Pietermaritzburg
3200
Tel Number: 033 - 897 1416
Fax Number: 033 - 897 1399

Tender Number:	ZNTM01140W	Project Code:	075988
CIDB Grading:	5GB OR HIGHER	Document Date:	29 August 2025
ECDP Number:	N/A	Contract Period:	8 Calendar Months

Contracting Party: _____

CIDB Registration number: _____

Central Suppliers Database Registration Number: _____

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

KWAZULU-NATAL PROVINCE
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THE CONTRACT

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DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

THE CONTRACT

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

C1 - AGREEMENT AND CONTRACT DATA

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

FORM OF OFFER AND ACCEPTANCE

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

C1.2 - CONTRACT DATA

C 1.2 CONTRACT DATA:
with GCC for Construction Works - Second Edition 2010

CONTRACT DATA FOR:

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

Tender no: **ZNTM01140W**

The General Conditions of Contract are the clauses contained in the General Conditions of Contract (2010) (Second Edition) published by the South African Institution of Civil Engineering. Copies of these conditions of contract may be obtained through most regional offices of the South African Institution of Civil Engineering, telephone number 011 805 5947 or by visiting their website at www.saice.org.za.

CONTRACT SPECIFIC DATA
The following contract specific data are applicable to this contract:

CONTRACT VARIABLES

This schedule contains all variables specific to this document and is divided into pre-tender and post-tender categories. The pre-tender category must be completed in full and included in the tender documents. Both the pre-tender and post-tender categories form part of this agreement.

Spaces requiring information must be filled in, shown as 'not applicable' or deleted but not left blank. Where choices are offered, the non-applicable items are to be deleted. Where insufficient space is provided the information should be annexed hereto and cross referenced to the applicable clause of the schedule. Key cross reference clauses are italicised in *[ ]* brackets.
The Engineer/Principal Agent, in accordance with Clause 1.1.1.16, shall obtain the specific approval from the Employer before executing any of his functions according to the "Conditions under which Consultants are appointed", or in the event where an employee of the Employer represents the Employer, the relevant General Delegations applicable at the time of executing his/her duties as described in Clause 3.1.2.

Part 1: CONTRACT DATA PROVIDED BY THE EMPLOYER:

PRE-TENDER INFORMATION

CONTRACTING AND OTHER PARTIES

[1.1.1.15] **Employer:**

Head: Public Works (KZN Department of Public Works: Province of KwaZulu-Natal)

Postal address:
Private Bag X 9041
PIETERMARITZBURG
3200

Tel: ***033 - 897 1300*** Fax: ***033 - 897 1399***

[1.2.1.2] Physical address:
191 Prince Alfred Street
PIETERMARITZBURG
3200

[1.1.1.16] **Employers Agent 1**
Sakhisizwe Architects

Agent's service:
PRINCIPAL AGENT / ARCHITECTS

Postal address:
33 Adelaide Tambo Drive
Durban North
4153

Tel: ***031 - 563 3424*** Fax: ***031 - 563 3518***

Employers Agent 2
LDM Quantity Surveyors DBN (Pty) Ltd

Agent's service:
QUANTITY SURVEYORS

Postal address:
P.O. Box 19233
Dormerton
4015

Tel: ***031 - 207 1340*** Fax: ***031 - 209 9441***

Employers Agent 3
Map Africa Consulting Engineers

Agent's service:
STRUCTURAL / CIVIL ENGINEERS

Postal address:
Suite ESS106A, Strathmore Park, 305 Musgrave Rd
Musgrave, Durban
4001

Tel: ***031 - 309 5831*** Fax: ***031 - 309 2929***

Employers Agent 4
DTM Mechanical & Electrical Engineering Durban

Agent's service:
MECHANICAL / WET SEVICES ENGINEERS

Postal address:
49 St Andrews Drive
Durban North
4051

Tel: ***031 - 003 8924*** Fax: ***N/A***

Tender no:	**ZNTM01140W**	
	Employers Agent 5 ***Ibuya Consulting Engineers*** ***Agent's*** service: ***ELECTRICAL ENGINEERS*** Postal address: ***P.O. Box 1692*** ***Wandsbeck*** ***3631*** Tel: insert ***031 - 266 7332***	Fax: ***031 - 266 7340***
	Employers Agent 6 ***Askham Consulting*** ***Agent's*** service: ***ASBESTOS INSPECTOR AUTHORITY*** Postal address: ***4 Oswald Shearer Road*** ***Pietermaritzburg*** ***3201*** Tel: insert ***033 - 342 2180***	Fax: ***N/A***
	Employers Agent 7 ***[Agents Name]*** ***Agent's*** service: ***[Identify Agent's Service, eg. Engineer]*** Postal address: ***[P.O. Box number]*** ***[Name of town]*** ***[Code]*** Tel: insert ***[Tel Number including Area Code]***	Fax: ***[Fax Number including Area Code]***
	Employers Agent 8 ***[Agents Name]*** ***Agent's*** service: ***[Identify Agent's Service, eg. Engineer]*** Postal address: ***[P.O. Box number]*** ***[Name of town]*** ***[Code]*** Tel: insert ***[Tel Number including Area Code]***	Fax: ***[Fax Number including Area Code]***
	PART 1: DATA PROVIDED BY THE EMPLOYER	
[1.1.1.13]	**Defects Liability Period** The defects liability period is: **A time measured from the date of the Certificate of Completion.** Defects Liability Period is 12 Months for the whole of the Works	
	Latent Defect Period	
[5.16.3]	The latent defect period is:	5 years after the Final Approval Certificate
	Documentation required before Commencement of the Works:	
[5.3.1]	The documentation required before commencement with the Works execution are;	
[4.3]	Health and Safety Plan	The Contractor shall deliver his Health and Safety Plan of the Works within 14 calendar days after notice from the Employer, prior to the Commencement Date.
[5.6]	Initial Programme	The Contractor shall deliver his programme of work within 14 calendar days after notice from the Employer, prior to the Commencement Date.
[6.2]	Guarantee	The Contractor shall deliver his chosen Guarantee (security) for this Works within 14 calendar days after notice from the Employer, prior to the Commencement Date.
[8.6]	Insurance	The Contractor shall deliver his insurance for the Works within 14 calendar days after notice from the Employer, prior to the Commencement Date.
	Cash flow by contractor	The Contractor shall deliver his Cash flow for the Works within 14 calendar days after notice from the Employer, prior to the Commencement Date.
	Programme	The Contractor is required to submit his Programme of Works in terms of Clause 5.6.1 and 5.3.1 and the Principal Agent is required to approve this within 7 days in terms of Clause 5.6.3
	Other requirements	
[5.3.2]	The time to submit the documentation required before commencement with Works execution is:	14 calendar days

	Non-Working days
[5.8.1]	Non-Working days: **Sundays** Special non- working days: **All Nationally Recognized Public Holidays and the year end break**
[5.8.1]	First Year end break - commences: ***16 Dec 24*** ends on: ***13 Jan 25*** Second Year end break - commences: ***16 Dec 25*** ends on: ***12 Jan 26*** Third Year end break - commences: ***16 Dec 26*** ends on: ***11 Jan 27*** Fourth Year end break - commences: ***16 Dec 27*** ends on: ***10 Jan 28***
[5.8.1]	Programme to accommodate year-end breaks.
	Engineer/Principal Agent to consult with Employer
[3.1.3]	The Engineer shall obtain the specific approval from the Employer before executing any of his functions according to the "Conditions under which Consultants are appointed", or in the event where an employee of the Employer represents the Employer, the relevant General Delegations applicable at the time of executing his/her duties.
	Security
[6.2.1]	The time to deliver the deed of guarantee is Prior to site hand over in terms of clause 5.3.1 and 5.3.2.
[6.2.1]	Please see CONTRACT DATA - below to select Guarantee Option
	Commencement Date Commencement date means the date of Site Hand over that should not occur prior to the tenderer receiving one fully signed copy of the Offer and Acceptance in terms of the Form of Offer and Acceptance.
	*The **Agreement comes into effect** on the date when;* *The tenderer receives one fully completed original copy of this document, including the Schedule of Deviations (if any)* *The agreement ("this document") consists of;* *1. Agreement and Conditions of Contract.* *2. Form of Offer and Acceptance.* *3. Contract Data.* *4. Scope of Works.* *5. Site Information.* *6. Drawings & documents referred to in the 1 to 4 above.* *(See Form of Offer and Acceptance)*
[5.3.1]	The contractor shall commence executing the Works within 7 calendar days from the Commencement Date.
[5.4.1]	***Possession of the* site** will be given within 10 calendar days after the **contractor** has fulfilled the conditions (4.3, 5.6, 6.2, 8.6) and received the notification from the Employer of Site Hand Over where the contractor will receive one fully signed copy of the Form of Offer and Acceptance from the **employer.**
[5.6.1]	The Contractor shall deliver his programme of work within 14 calendar days after notice from the Employer, prior to the Commencement Date.
	CONTRACT DETAILS
[1.1.1.33]	***Works*** description: Refer to document C3 – Scope of Work.
[1.1.1.30]	***Site*** description: Refer to document C4 – Site Information.
	Specific options that are applicable to a **State** organ only Where so :
[6.10.6.2]	***1)*** Interest rate legislation: ***(a)*** in respect of interest owed by the **employer**, the interest rate as determined by the Minister of Justice and Constitutional Development from time to time, in terms of section 1(2) of the Prescribed Rate of Interest Act, 1975 (Act No. 55 of 1975), will apply; and ***(b)*** in respect of interest owed to the **employer**, the interest rate as determined by the Minister of Finance, from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No. 1 of 1999), will apply
	2) Lateral support insurance to be effected by the contractor: — ***Yes X*** / ***No***
	3) Payment will be made for materials and goods — ***Yes X*** / ***No***
	4) Dispute resolution by litigation — ***Yes*** / ***No X***
	5) Extended **defects** liability period applicable to the following elements: — ***Whole of the works***
[8.6.1.1.2]	The Value of material, supplied by the Employer, and not included in the Contract Price, is: ***R0.00***
[8.6.1.1.3]	The amount to cover Professional Fees, not included in the Contract Price, for repairing damage and loss to be included in the insurance: ***30% of the Contract Price***
[8.6.1.3]	The limit for indemnity for liable insurance is: ***Unlimited claims***
[6.5.1.2.3]	The percentage allowance to cover overhead charges for contractor and subcontractors, is: ***10.00%***
[1.1.1.14]	**Practical Completion Date** The Practical Completion date is: **8 calendar months after date of formal site handover.**
	For the **works** as a whole: The whole of the works shall be completed within: ***8*** *Months (which shall be deemed to include all Non – Working Days, Special Non – Working Days and the year-end Builders Annual Industry Holiday Periods).*
[5.5.1]	The date for **practical completion** shall be ***8 calendar months after date of formal site handover***
[5.13.1]	The penalty per calendar day shall be : ***0.04% of the Contract Price of the value of the Phase which is not***

	***For the* works** in **sections:**
	***The date for* practical completion** from the **commencement date** and the **penalty** per **calendar day:**
	Portion 1:
[5.5.1]	***4 Months***
[5.13.1]	***0.04% of the Contract Price of the value of the Phase which is not completed by the Practical Completion date, rounded to the nearest R10***
	Portion 2:
[5.5.1]	***4 Months***
[5.13.1]	***0.04% of the Contract Price of the value of the Phase which is not completed by the Practical Completion date, rounded to the nearest R10***
	Portion 3:
[5.5.1]	***N/A***
[5.13.1]	***0.04% of the Contract Price of the value of the Phase which is not completed by the Practical Completion date, rounded to the nearest R10***
	Portion 4:
[5.5.1]	***N/A***
[5.13.1]	***0.04% of the Contract Price of the value of the Phase which is not completed by the Practical Completion date, rounded to the nearest R10***
	Portion 5:
[5.5.1]	***N/A***
[5.13.1]	***0.04% of the Contract Price of the value of the Phase which is not completed by the Practical Completion date, rounded to the nearest R10***
	Portion 6:
[5.5.1]	***N/A***
[5.13.1]	***0.04% of the Contract Price of the value of the Phase which is not completed by the Practical Completion date, rounded to the nearest R10***
[1.3.2]	***The* law** applicable to this **agreement** shall be that of the: **Republic of South Africa**
[6.10.1.5]	The percentage advance on materials not yet built into the Permanent Works is: ***80.00%***
[6.10.3]	Percentage retention on amounts due to contractor is: ***According to the percentage options selected by the contractor in securities offered in offer and acceptance.***
	Maximum retention is: ***0.00%*** *of the Contract Price*
[6.8.1]	Notwithstanding anything to the contrary contained in the General conditions of Contract and Preliminaries, this contract could only, when the construction period exceeds 6 months and the contract exceeds R1,000,000.00, be subject to a Contract Price Adjustment Factor.
[6.8.2] *[6.8.3]*	Clause 6.8.2 the last part of the sentence saying *"calculated according to the formula and the conditions set out in the Contract Price Adjustment Schedule."* must be replaced by *"calculated according to the Contract Price Adjustment Provisions (CPAP) Indices Application Manual for use with P0151 indices (Revised 1 January 2013)" as published by Statistics South Africa. The Contract Price Adjustment Provision (CPAP) will be subject to the most recently released indices by Statistic South Africa. Tenderers are advised that with reference to Clause 3.4.6 of the Contract Price Adjustment Provisions (CPAP) Indices Applications Manual, the Head: Public Works will not accept the submission by Tenderers of lists of additional items."*
[6.8.2] *[6.8.3]*	Where this contract is a Lump Sum contract, the contract will only be subject to Contract Price Adjustment Provisions (CPAP)(Revised 1 January 2013) where the contract period equals or exceeds 6 calendar months. The applicable work group shall be WG 180 for domestic buildings or WG 181 for commercial and industrial buildings only.
[5.14.5]	***The following clause must be added to clause 5.14.5:*** *[5.14.5.6]* The employers agent shall submit the **final account** within 3 calendar months to the principal agent.
[10.5] *[10.5.3]* *[10.9.1]*	The determinations of disputes shall be by ARBITRATION. The number of Arbitration Board Members to be appointed is: One Replace the last part of the clause with the following: *"..on the application of either party, by the Chairman, or his nominee of the Association of Arbitrators."*
	***Where* CPAP** is applicable, the **contract sum** will be adjusted in accordance with the Contract Price Adjustment Provisions (**CPAP**) as set out in the **CPAP** Indices Application Manual as published by Statistics South Africa, dated 1 January 2013 and any amendments thereto: 1) Glass etc. measured in specialist section Metalwork, will be adjusted in terms of the index for that work group unless specifically stated otherwise in the bills of quantities. 2) In case of uninterruptible power supplies, elevators, escalators and hoists, generating sets, motor-alternator sets and intercommunication systems shall be adjusted in accordance with Work Group 170. 3) Further to clause 3.4.6 of the CPAP Indices Application Manual, the listing of additional items for exclusion by Tenderer's, will not be permitted. ***Alternative Indices:* Not Applicable**
	Details of changes made to the General Conditions of Contract for construction works (2010) Second Edition
	Clause
[1.1]	*[1.1.1.5]* **COMMENCEMENT DATE** – means the actual date of Site Hand over that should not occur prior to the Tenderer receiving one fully signed copy of the Offer and Acceptance in terms of the Form of Offer and Acceptance.
	[5.12.2.2] **ABNORMAL CLIMATIC CONDITIONS** - means conditions over and above what could reasonably be expected for the specific locality where the Works are being executed and include inter alia excessive rain, heat, cold, wind and any other climatic condition that would not normally be experienced during the season that the Works are executed in that area. The South African Weather Service's (http://www.weathersa.co.za) 10 year average climatic conditions statistics would be what could be reasonably expected for the specific locality where the Works are executed.
	[6.2.1] **CONSTRUCTION GUARANTEE** – means an on demand guarantee at call obtained by the **contractor** from an institution approved by the **employer** in terms of the **employer's** construction guarantee form as selected in the Offer and Acceptance Form and the **contract data.**
	CONSTRUCTION PERIOD – means the period commencing on the **commencement date** and ending on the date of **due completion date.** This period will be deemed to commence on actual site hand over date to the contractor and end on the date of practical completion and shall include all annual industrial holiday periods, Sundays and public holidays.
	CORRUPT PRACTICE – means the offer, giving, receiving, or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.
	FINAL ACCOUNT - The document prepared by the principal agent, which reflects the contract value of the works at final approval or termination.
	FRAUDULENT PRACTICE – means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of any tenderer and includes collusive practise among tenderers (prior to or after the tender submission) designed to establish tender prices at artificial non-competitive levels and to deprive the tenderer of the benefits of free and open competition.

INTEREST – the interest rates applicable on this contract, whether specifically indicated in the relevant clauses or not, will be in terms of the legislation of the Republic of South Africa, and in particular:

(a) in respect of interest owed by the **employer,** the interest rate as determined by the Minister of Justice and Constitutional Development from time to time, in terms of section 1(2) of the Prescribed Rate of Interest Act, 1975 (Act No. 55 of 1975), will apply; and

(b) in respect of interest owed to the employer, the interest rate as determined by the Minister of Finance, from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No. 1 of 1999), will apply

[1.1.1.16] **ENGINEER/PRINCIPAL AGENT –** means the person or entity appointed by the **Employer** and named in the **Contract Data** as the **Engineer /Principal Agent** to act as agent of the **Employer**. In the event of an Engineer/**Principal Agent** not being appointed, then all the duties and obligations of an Engineer/**Principal Agent** as detailed in the **Contract** shall be fulfilled by a representative of the **Employer** as named in the **Contract Data. (Hereafter referred to as Engineer)**

[1.1.1.21] **GENERAL ITEMS -** or preliminaries means items stipulated in the Pricing Data relating to general obligations, site services, facilities and/or items that cover elements of the cost of the work which are not considered as proportional to the quantities of the Permanent Works.

[4.4.1] Add the following to the clause 4.4.1: *"The Contract shall only use subcontractors who are duly registered with the CIDB and who has an ACTIVE status at the time of submitting the tender"*

[6.2.1] Refer to Offer and Acceptance form for the various options that the contractor may choose from in providing a form of **Guarantee** under "GUARANTEE OPTIONS".

[6.10.6.2] Replace *"at the prime overdraft rate, as charged by the Contractor's Bank,"* with *"..at the interest rate as determined by the Minister of Justice and Constitutional Development from time to time, in terms of section 1(2) of the Prescribed Rate of Interest Act, 1975 (Act No. 55 of 1975)."*
Omit *",on all overdue payments from the date on which the same should have been paid..."* and replace with *" only after 30 calendar days from receiving written notice from the Contractor that the amount is overdue,.."*

SPECIAL CONDITIONS OF CONTRACT

[5.12.3] Omit clause 5.12.3 and add the following:
"5.12.3. If an extension of time is granted, the Contractor shall be paid such additional time-related General Items, including for special non-working days, if applicable as are appropriate regarding to any other compensation which may already have been granted in respect of the circumstances concerned. The reasons for extension of time that would invoke payment of time related General Items are inter alia;

5.12.3.1 Failure to give possession of the site to the contractor.
5.12.3.2 Making good physical loss and repairing damage to the works where the contractor is not at risk.
5.12.3.3 Contract instructions not occasioned by default by the contractor.
5.12.3.4 Failure to issue construction information timeously or the late issue of a contract instruction following a request from the contractor.
5.12.3.5 Late acceptance by the principal agent of a design undertaken by a selected subcontractor where the contractor's obligations have been met.
5.12.3.6 Suspension or cancellation termination invoked by a nominated or selected n/s subcontractor due to default by the employer or the principal agent.
5.12.3.7 Insolvency of a nominated subcontractor.
5.12.3.8 A direct contractor.
5.12.3.9 Opening up and testing of work and materials and goods where such work is according to in accordance with the contract documents.
5.12.3.10 The execution of additional work for which the quantity included in the bills of quantities is not sufficiently accurate.
5.12.3.11 Late or failure to supply materials and goods for which the employer is responsible.
5.12.3.12 Suspension of the works."

[5.14.5.1] Omit entire clause 5.14.5.1

[5.16.4] Add the following new clause *"5.16.4. Upon the issue of a Final Approval Certificate, unless otherwise provided in the Contract:*
5.16.4.1. The performance Guarantee (if any) shall be returned within 14 days to the guarantor in terms of Clause 7."

[6.2.2] Replace the following *"..it shall be deemed that the Contractor has selected a security of ten percent retention of the value of the Works."* with *"..it shall be deemed that the Contractor has selected a security of a bank or insurance guarantee of 5% of the value of the Works and a payment reduction of 5% of the value certified in the payment certificate excluding value added tax."*

[6.2.3] Add to clause 6.2.3 the following "*The Contractor shall provide proof of paid-up premium payments to accompany his payment certificate as proof that his performance guarantee has not expired yet. The Contractor will not receive payment without proof of the validity of their performance*

[9.3.2.2] Omit *"without prejudice to the exercise of any lien the Contractor may have acquired over the Employer's property."*

Duties and functions of the **Engineer** requiring the specific approval of the **Employer** BEFORE execution of any part of these duties are as follows:

(a) Determinations of contractors claims for extension of time (revision of the contract completion date). All claims for extension of time shall be submitted by the **Engineer,** together with the **Engineer's** recommendations, to the **Employer** for determination. Omit "Engineer" in clause 42.2

(b) Drawings, instructions or communications of any kind requiring variations of the works and involving EXTRA's shall NOT be given effect by the **Contractor** UNTIL BOTH the "Official Variation Order" and the "Financial Request for Variation Order and Additional Funds" form, as issued by the Department of Public Works, have been approved and signed by the **Employer**.

(c) Insurance policies to be approved by the **Employer** within 21 days of the date of the **Commencement** of the Works.

(d) Any notice of disagreement raised by the **Contractor** or written Dispute Notice given by the **Contractor** to the **Engineer** shall be submitted by the **Engineer**, together with the **Engineer's** recommendations, to the **Employer** for determination.

(e) The issue of the certificate of practical completion, certificate of completion and the final approval certificate shall be signed and submitted by the **Engineer**, to the **Employer** for final approval and signature. The certificates shall not be considered as officially issued until signed by the

MANAGING PROJECT DURATION

(a) The Contractor shall co-ordinate his programme with all other contractors whose work may precede or be executed simultaneously to his own. The Contractor will be called upon to plan and control the project using the Project Evaluation and Review Technique (PERT) or other approved Critical Path Method (CPM) network analysis of his events and activities and those of the dub-contractors in his employ and must co-ordinate his planning with any other contractor employed on the project. A fortnightly project control report will be expected from the Contractor in writing, evaluating any gains or delays against the critical path and he should allow for all costs involved in planning reviewing and updating the programme to the satisfaction of the Principal Agent against this item.

(b) Activity-and total float shall belong to the Employer.

(c) The Contractor shall deliver his programme of work within 14 calendar days after notice from the Employer, prior to the Commencement Date. It is a condition of this contact that, the contractor submit to the Engineer/principal agent a detailed CPM Programme which shall be to the approval of the Engineer/principal agent. In this regard tenderers are advised to consult with the Engineer/Principal Agent as to the format and requirements of the programme as no claim whatsoever will entertained should the programme fail to meet the requirements of the Engineer/Principal Agent. Failure to submit the programme within the stipulated time may result in the contractor being held in breach of contract.

The approved programme will form the basis of time management of the project and extension of time will not be guaranteed unless the Contractor has strictly complied with this provision.
The programme shall make allowance for rain and the number of rain days allowed within the critical path shall be on the provisions of the clause dealing with inclement weather and claiming for delays in performance in this bill.
Allowance for the above must be made under this item as no claims for failing to comply with this precondition will later be entertained.

INCLEMENT WEATHER AND CLAIMS FOR DELAYS IN PERFORMANCE

(a) All delay claims due to inclement weather during which rainfall exceeds 10mm per day for months as indicated in the Scope of Works, shall be according to applicable clauses stipulated in the General Conditions of Contract for Contraction Works (2010) Second Edition.

(b) Claims for delays in performance due to inclement weather shall be calculated separately for each calendar month and for the project as a whole. Delays or gains to the critical path shall be reflected in all revisions of the programme. An extension of time will only be granted where the following conditions are met:

(i) The criteria to be used for WORK stoppages shall be for safety hazards or poor quality of work.
(ii) The Employer's site representative or the Employer's Principal Agent, if the site representative is not available shall be notified when the Contractor stops the work and intends to claim performance delays. The Employer representative shall inspect the situation together with the Contractor and give an immediate decision

1. The stoppage claimed must cause a delay in the Completion Date of work. If the critical activities can proceed and a non-critical activity is delayed due to inclement weather no claims for delay shall be granted.
2. No claims for stoppages less than 2(two) hours per day shall be considered.
3. Claims granted for more than 2 (two) hours, but less than 10 (ten) hour (lunch included) day, shall be added together and expressed as full days.
4. All claims shall be submitted in writing to the Principal Agent within one working day of the actual stoppage.
5. The total delay in performance granted to the Contractor expressed in days shall be added to the contractual Completion Date of each section of the Works. The contractual penalty clause shall only come into effect after this newly arrived date.
6. Total delays (in hours) will be rounded up or down to the nearest integer for the calculation of Working Days. The total hours (including lunch) per Working Day shall be 10 unless otherwise indicated on the Contractor's programme.
7. Where the programmed delays for inclement weather exceed the actual delays incurred the Completion Date(s) will not be adjusted.
8. Where the project includes builder's holidays the programmed durations for inclement weather shall be adjusted pro-rate to the actual Working Days.
9. The total of all monthly delays due to inclement weather shall be calculated in accordance with the example given below:

Description		Months					Total
		Sept	Oct	Nov	Dec	Jan	
		Hours	Hours	Hours	Hours	Hours	Hours
Programmed	Rain days	0	30	30	15	15	90
Actual	Rain days	16	22	35	15	18	106
Difference		-16	8	-5	0	-3	-16
8 hrs/day*						Estimated Extension of time - in working days	2

See point 5.2 in the Scope of Works for the specific days the tenderer must allow for in this contract.

Tender no: **ZNTM01140W** **Part 2: CONTRACT DATA PROVIDED BY THE CONTRACTOR:**

POST-TENDER INFORMATION

Note: All information for this section requires consultation with the **Contractor**. The **Engineer/Principal Agent** shall not pre-select any of the alternatives available to the **Contractor.**

1 CONTRACT DETAILS

[1.1.1.9] **Contractor Name:** _____

[1.2.1.2] Postal address:

_____

_____

_____

Tel no _____ Fax no _____

Tax / VAT Registration No: _____ e-mail _____

Physical address:

_____

_____

_____

[1.1.1.10] The accepted **contract price** inclusive of **tax** is R :

[Amount in words]

Payment Of Preliminaries (Clause 6.7, 6.8, 6.10 and 6.11)

The preliminaries amounts shall be paid in terms of:

***Alternative A**	**Yes**
****Alternative B**	**N/A**

** Assessed by the Engineer/Principal Agent as an amount prorated to the value of the Work duly executed in the same ratio as the Preliminaries bears to the Contract Price excluding VAT, Preliminary amount, Contingencies and any CPAP.*

*** Calculated from the priced Bill of Quantity/Lump Sum document. The Contractor and the Engineer/Principal Agent shall agree on a division of the priced Preliminaries items into: initial establishment charge, monthly charge and final disestablishment charge.*

If the Contractor and the Engineer/Principal Agent can not agree, within 10 Working Days from the Commencement Date, on such a division then the Engineer/Principal Agent shall make a division of the Preliminaries to be incorporated in the valuations for each monthly payment certificate as follows;

10% of the General Items/Preliminaries amount shall not be varied

15% of the General Items/Preliminaries shall only be varied in proportion of the Contract Price to the Contract Sum

75% of the General Items/Preliminaries shall be varied in proportion to the revised Construction Period compared with the initial Construction Period.

Alternative A

Adjustment of Preliminaries (Clause 6.7, 6.8, 6.10 and 6.11)

For the adjustment of Preliminaries both the Contract Sum and the Contract Value (including tax) shall exclude the amount of Preliminaries, all Contingency Sum(s) and any provision for Cost Price Adjustment Provisions:-

- An amount which shall not be varied.

- An amount varied in proportion to the contract value as compared to the Contract Sum.

- An amount varied in proportion to the Construction Period as compared to the initial Construction Period (excluding revisions to the Construction Period to which the Contractor is not entitled) to adjustment of the Contract Value in terms of the agreement.

The Contractor shall provide a breakdown of charges (including tax) within 15 working days of the date of acceptance of tender and, where applicable, an apportionment of Preliminaries per section

If the Contractor and the Principal Agent cannot agree, within ten (10) Working Days from the Commencement Date, on such a division then the Principal Agent shall make a division of the Preliminaries to be incorporated in the valuations for each monthly payment certificate as follows;

10% of the amount shall not be varied

15% varied in proportion of the Contract Value to the Contract Sum

75% varied in proportion to the revised Construction period compared with the initial Construction Period

Sectional Completion : Subdivision of Preliminaries Costs

For the adjustment of preliminaries for sections of the work the value of fixed, value, and time related amounts of the preliminaries for each section is required. The contractor is to provide such information within fifteen (15) working days of taking possession of the site, failing which the categorised preliminaries amounts shall be prorated to the value of each section.

The above shall apply equally for projects where sectional completion was not contemplated at tender stage but subsequently occurred on an adhoc basis during construction of the works as agreed between the client and the employer. The original priced categorised amounts for fixed, value, and time related amounts shall be prorated to the value of each section.

When an extension of time has been granted in terms of the GCC and the preliminaries require to be adjusted accordingly, the pertinent sectional (subdivided) categorised preliminaries amounts shall be utilised, where applicable and not the overall preliminary amounts.

Where sectional completion is required in terms of the agreement, the Contractor shall provide the Principal Agent with the division of the above categorized amounts into sections. Should the Contractor fail to provide such information within the period stipulated the categorized amounts shall be prorated to the value of each section.

YES *yes / no*

or

Alternative B

The Contractor shall within 15 working days of the date of possession of the site provide the Principal Agent with a detailed breakdown of Preliminaries amounts for the works as a whole, or per section where applicable, including administrative and supervisory staff charges and for the use of construction equipment in terms of the programme.

NO *yes / no*

The contractor is informed that only alternative 'A' shall apply

2 DOCUMENTS

Contract documents marked and annexed hereto:

Priced **Bills of Quantities:**	**Yes**	X	**No**	
Lump Sum document: :	**Yes**		**No**	X

Guarantee Options:

Not applicable

2.2 DESIGN BRIEF

Not applicable	NO	YES or NO

2.3 DRAWINGS

See list of Drawings/Annexures attached to this document.	YES	YES or NO

2.4 DESIGN PROCEDURES

Not applicable	NO	YES or NO

Contract drawings:	**Yes**	X	**No**	
Other documents:				

Waiver of the Contractors lien or right of continuing possession is required. **YES**

GUARANTEE OPTIONS

The Tenderer agrees to provide a bank or insurance guarantee in accordance with clause 6.2.3 of the Conditions of the GCC2010 Contract within the period stated in the Contract Data. This guarantee shall be for a sum equal to an amount stated in the Contract Data.

Guarantees submitted must be issued by either an insurance company duly registered in terms of the Insurance Act (Long Term Insurance Act No 52 of 1998 or Short Term Insurance Act No 53 of 1998) or by a bank duly registered in terms of the Banks Act No 94 of 1990, on the pro-forma referred to above. No alterations or amendments of the wording of the pro-forma will be accepted.

(a) the tenderer accepts that in respect of contracts up to R1 million, a payment reduction of 5% of the contract value will be applicable and will be reduced by the Employer in terms of the applicable conditions of contract.

(b) in respect of contracts above R1 million, the Tenderer offers to provide security as indicated below: select one option

(i) cash deposit of 10 % of the Contract Price	
(ii) bank or insurance Performance Guarantee of 10 % of the Contract Price	
(iii) cash deposit of 5% of the Contract Price and a payment reduction of 5% of the value certified in the payment certificate (excluding VAT)	
(iv) bank or insurance guarantee of 5% of the Contract Price and a payment reduction of 5% of the value certified in the payment certificate (excluding VAT)	

NOTE: Where the Tenderer has not selected one of the guarantee options above, the default option will be as if the Tenderer has selected a security of a bank or insurance guarantee of 5% of the value of the Works and a payment reduction of 5% of the value certified in the payment certificate excluding value added tax. - See GCC2010 clause 6.2.2 as amended in Contract Data.

3 SIGNATURES OF THE CONTRACTING PARTIES

Thus done and signed at.....on .....of.....20.....

Name of signatory — for and behalf of the **Employer** who by signature hereof

Capacity of signatory — as Witness.

Thus done and signed at.....on .....of.....20.....

Name of signatory — for and behalf of the **Contractor** who by signature hereof

Capacity of signatory — as Witness.

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

C1.3 - FORM OF GUARANTEE

C1.3 PERFORMANCE GUARANTEE - GCC FOR CONSTRUCTION WORKS (2nd Edition - 2010)

Head: Public Works
KZN Department of Public Works:
Private Bag X 9041
PIETERMARITZBURG
3200

Sir,

ON DEMAND PERFORMANCE GUARANTEE

Tender Number ZNTM01140W	Project Code 075988

For use with the General Conditions of Contract for Construction Works, Second Edition, 2010.

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means: _____

Physical Address: _____

"Employer" means: The Provincial Administration of KwaZulu-Natal in its Department of Public Works

"Contractor" means: _____

"Engineer" means: _____

"Works" means: **DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK**

"Site" means: _____

"Contract" means: The Agreement made in terms of the Form of Offer and Acceptance and such amendments or additions to the Contract as may be agreed in writing between the parties.

"Contract Sum" means: The accepted amount inclusive of tax of: _____

Amount in Words:

"Guaranteed Sum" means: The maximum aggregate amount of: 10% _____
Of Contract Sum

Amount in Words: _____

"Expiry Date" means: _____

CONTRACT DETAILS

Engineer Issues: Interim Payment Certificates, Final Payment Certificates and the Certificate Completion of the Works as defined in the Contract.

PERFORMANCE GUARANTEE

1 The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.

2 The Guarantor's period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the Expiry Date or the date of issue by the Engineer of the Certificate of Completion of the Works or the date of payment in full of the Guaranteed Sum, whichever occurs first. The Engineer and/or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.

3 The Guarantor hereby acknowledges that:

3.1 any reference in this Performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;

3.2 its obligation under the Performance Guarantee is restricted to the payment of money.

4 Subject to the Guarantor's maximum liability referred to in 1, the Guarantor hereby undertakes to pay the Employer the sum certified upon receipt of the documents identified in 4.1 to 4.3:

4.1 A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Engineer in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 4.2:

4.2 A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address with a copy to the Contractor stating that a period of seven (7) days has elapsed since the first written demand in terms of 4.1 and the sum certified has still not been paid;

4.3 A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum Certified in 4.

5 Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the Employer the Guaranteed Sum or the full outstanding balance upon receipt of a first written demand from the employer to the Guarantor at the Guarantor's physical address calling up this Performance Guarantee, such demand stating that:

5.1 the Contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 5; or

5.2 a provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 5; and

5.3 the aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.

6 It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.

7 Where the Guarantor has made payments in terms of 5, the Employer shall upon the date of issue of the Final Payment Certificate submit an expense account to the Guarantor showing how all monies received in terms of this Payment Guarantee have been expended and shall refund to the Guarantor any resulting surplus. All monies refunded to the Guarantor in terms of this Performance Guarantee shall bear interest at the prime overdraft rate of the Employer's bank compounded monthly and calculated from the date payment was made by the Guarantor to the Employer until the date of refund.

8 Payment by the Guarantor in terms of 4 or 5 shall be made with seven (7) calendar days upon receipt of the first written demand to the Guarantor.

9 Payment by the Guarantor in terms of 5 will only be made against the return of the original Performance Guarantee by the Employer.

10 The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.

11 The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.

12 This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.

13 This Performance Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.

14 Where this Performance Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Court Act No 32 of 1944, as amended, to this jurisdiction of the Magistrate's Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Signed at _____

Date _____

Guarantor's signatory (1) _____

Capacity _____

Guarantor's signatory (2) _____

Capacity _____

Witness signatory (1) _____

Witness signatory (2) _____

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

PART C2 - PRICING DATA

C2.1 PRICING INSTRUCTIONS GCC FOR CONSTRUCTION WORKS (Second Edition 2010)			
Project title:	**DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK**		
Tender no:	**ZNTM01140W**	**Project Code:**	**075988**

C2.1 Pricing Instructions

	Where any item is not relevant to this specific contract, such item is marked N/A (signifying "not applicable") The adjustment of the preliminaries each item priced is to be allocated to one or more of the three categories by insertion of "F", "V", "T" as the case may be against the price in the "rate" column immediately preceding the "amount" column, where "F" denotes a fixed amount (amount not varied), "V" denotes an amount variable in proportion to value and "T" denotes an amount variable in proportion to time.
1	**MASSES AND MEASURING UNITS** These shall be in accordance with the Measuring Units and National Measuring Standards Act No. 76 of 1973 and amendments thereto. The pages of each of these documents are numbered consecutively and before the Tenderer submits his tender he should check the number of pages, and if any are found missing or duplicated, or the figures or writing indistinct, or the documents contain any obvious error, he should apply to the Head : Public Works AT ONCE and have same rectified as no liability whatsoever will be admitted by the Administration in respect of errors in Tender due to the foregoing.
2	**PRICES FOR VARIATIONS** Where prices or quotations for variations are submitted by the Contractor during the currency of the Contract, it is to be clearly understood that these are for the purpose of consideration by the Head : Public Works and that there is no assumption of acceptance. The Contractor will be notified of acceptance of prices or quotations either by insertion of the amount on the variation order or by written intimation.
3	**SCALE** The scale to which the Drawings are made is only to be made use of when no figured dimensions are given either on the Drawings or in the tender documents and the figured dimensions are always to be followed though they may not coincide with the scale of the Drawings, but dimensions where possible are to be taken from the buildings.
4	**PROVISIONAL ITEMS** All items described as "Provisional" shall be used as directed by the Employer and measured and valued or paid for. No work for which "Provisional" items are allowed shall be commenced without written instructions from the Head : Public Works.

5	**TIMELY ORDERING OF MATERIALS** The Contractor is warned to place all orders for materials or special articles as early as possible, as he will be held solely responsible for any delay in the delivery of such goods. Nevertheless this tender is conditional upon no liability being attached to the Contractor if delivery of materials is rendered impossible by reason of any act of the Government.
6	**ELECTRICAL LIGHTING, POWER AND WATER** The Contractor shall provide any artificial lighting which may be necessary or required for the proper execution of the works, and provide electric power and water required by all Sub-Contractors, Nominated Sub-Contractors and Sub-Contractors appointed directly by the Employer. The Contractor shall give all notices and pay all fees in connection with temporary electrical and water connections and shall connect temporary Electrical and Water meters for and pay for all current and water consumed. Tenderers are advised that the permanent light fittings and water points of any kind installed in the Works are not to be used to provide temporary lighting and supplement water requirements for construction purposes.
7	**IMPORT PERMITS, DUTIES AND SURCHARGES.** All tenders by means of which imported products are being called for, must use the rate of exchange 14 days prior to the closing date indicated in the tender documents. If this day falls on a weekend or public holiday, the next working day must be used. Furthermore, Tenderers must submit documentary proof (in the form of a certified copy) from their bank or legally recognised financial institution, clearly indicating what the rate of exchange was 14 days prior to the closing date, as mentioned above. Together with this, the Tenderer must confirm that the tender price relating to an imported product, was based on the rate of exchange 14 days prior to the closing date as mentioned above.
8	**STANDARD SYSTEM OF MEASUREMENT WHERE BILLS OF QUANTITIES FORM PART OF THE TENDER DOCUMENTS** The work executed under this Contract has been measured in accordance with the; **Standard System of Measuring Builders Work (7th Edition)** including all amendments unless descriptions of items indicate a deviation and it shall be understood that the system of measurement which is herein adopted is the only system of measurement which will be recognised in connection with this contract. Any contradictions to this system of measurement contained in the "DOH - Standard Preambles to All Trades: Revision 3 January 2009" shall be disregarded (unless same have been accommodated in the system of measurement) but applicable rates shall be included for all requirements stated and not measured separately in compliance with this system.
9	**PRICING OF ROCK EXCAVATIONS** It is a condition of this tender that should the tenderer elect to price the Rock Excavation included in this tender, the rates must be market related and should be identically priced for the same classification of excavations and not vary for similar billed items in the different sections.

10 BROAD BASED BLACK ECONOMIC EMPOWERMENT

1. It is the deliberate policy of the Provincial Administration of KwaZulu-Natal to foster and to encourage the economic empowerment of Black South Africans. This policy will be implemented without prescription and without prejudicing the principles and the integrity of the Provincial Administration of KwaZulu-Natal. Subject to these constraints and also subject to good business practice and commercial consideration, it is therefore considered appropriate that the Provincial Administration of KwaZulu-Natal should encourage business relationships with companies which actively pursue Affirmative Action and Black Economic Empowerment Programmes.
2. In responding to this tender you are therefore encouraged to devote attention to these two subjects of Affirmative Action and Economic Empowerment. In addition, in considering the appointment of sub-contractors, you are requested to extend the spirit of these policies.
3. The foregoing enunciations of this policy are not intended to be prescriptive nor to preclude any individual or operation from responding to this tender.

11 REGISTRATION ON THE CENTRAL SUPPLIERS DATABASE

1. In terms of the Public Finance Management Act (PFMA), 1999 (Act No 1 of 1999) Section 38 (1) (a) (iii) and 51 (1) (iii) and Section 76 (4) of PFMA National Treasury developed a single platform, The Central Supplier Database (CSD) for the registration of prospective suppliers including the verification functionality of key supplier information.
2. Prospective suppliers will be able to self - register on the CSD website: www.csd.gov.za
3. Once the supplier information has been verified with external data sources by National Treasury a unique supplier number and security code will be allocated and communicated to the supplier. Suppliers will be required to keep their data updated regularly and should confirm at least once a year that their data is still current and updated.
4. Suppliers can provide their CSD supplier number and unique security code to organs of state to view their verified CSD information.
5. Tenderers are required to fill in clearly, legibly, in bold print and black ink their CSD supplier number in the space hereunder:

Name of Supplier	
Central Supplier Database (CSD) Supplier Number:	

12 TAX CLEARANCE REQUIREMENTS

It is a condition of tender that the taxes of the successful tenderer must be in order, or that satisfactory arrangements have been made with South African Revenue Service (SARS) to meet the Tenderer's tax obligations. It is a condition of this Offer of Commission that your practice remains in good standing with SARS (South African Revenue Services) in terms of its tax clearance, during the project, which is required to process your payment certificates.

1. In order to meet this requirement tenderers are required to apply via e-filing at any SARS branch office nationally. The Tax Compliance Status (TCS) requirements are also applicable to foreign Tenderers / individuals who wish to submit Tenders.
2. SARS will then furnish the Tenderer with a Tax Compliance Status (TCS) PIN that will be valid for a period of 1 (one) year from the date of approval.
3. In tenders where Consortia / Joint Ventures / Sub-contractors are involved, each party must submit a separate Tax Compliance Status (TCS) PIN.
4. Application for Tax Compliance Status (TCS) PIN can be done via e-filing at any SARS branch office nationally or on the website www.sars.gov.za.

	5 Tax Clearance Certificates may be printed via eFiling. In order to use this provision, taxpayers will need to register with SARS as eFilers through the website www.sars.gov.za. 6 Tax Clearance Certificates may be printed via eFiling. In order to use this provision, taxpayers will need to register with SARS as eFilers through the website www.sars.gov.za.	
	Security PIN Number	
	Company / Entity Tax Reference Number	
13	**BILLS OF QUANTITIES/LUMP SUM DOCUMENT** The Bills of Quantities document forms part of and must be read and priced in conjunction with all the other documents forming part of the contract documents, the Standard Conditions of Tender, Conditions of Contract, Standard Preambles to all Trades, Specifications, Drawings and all other relevant documentation.	
14	**VALUE ADDED TAX** The tender price must include for Value Added Tax (VAT). All rates, provisional sums, etc. in the Bills of Quantities must however be net (exclusive of VAT) with VAT calculated and added to the Total Value thereof in the Final Summary.	
15	**FIXED PRICE CONTRACT** Should the Bills of Quantities/Lump Sum Document be a fixed price contract, the following clause must be inserted in the Pricing Instructions: Tenderers are to take note that the contract price adjustments are not applicable to this contract. Tenderers should therefore make provision in the Contract Sum, schedule of rates, etc. for possible price increases during the contract period, as no claims in this regard shall be entertained.	

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

C2.2 - Preliminaries for GCC for Construction works - 2nd Edition 2010

DPW - ASBESTOS ERADICATION PROGRAMME
WIMS NO. 075988 - ST ANDREWS HOSPITAL
PROVISIONAL BILLS OF QUANTITIES

BILL NO. 1
PRELIMINARY AND GENERAL

	NOTES	UNIT	QUANTITY	RATE	AMOUNT
i)	The agreement is to be the General Conditions of Contract for Works of Civil Engineering Construction (2010) (Second Edition) , published by the S. A. Institution Of Civil Engineering.				
ii)	The Preliminaries are to be the Construction and management requirements for works contracts - Part 1: General engineering and construction works (SANS 1921-1: 2004 Edition 1) prepared by Standards South Africa and shall be deemed to be incorporated herein.				
iii)	Tenderers are referred to the abovementioned documents for the full intent and meaning of each clause thereof (hereinafter referred to by heading and clause number only) for which such allowance must be made as may be considered necessary.				
iv)	Where standard clauses or alternatives are not entirely applicable to this contract such modifications, corrections or supplements as will apply are given under each relevant clause heading.				
v)	Where any item is not relevant to this specific contract such item is marked N/A (signifying "not applicable").				
vi)	Adjustment of the preliminaries: each item priced, is to be allocated to one or more of the three categories, where "F" denotes a fixed amount (amount not to be varied), "V" denotes an amount variable in proportion to value and "T" denotes an amount in proportion to time.				
vii)	Time (T) related Preliminaries will only be adjusted for omissions or additions, issued by the Employer, or delays caused by the Employer, for which variation and extension of time has been granted. ***See Contract Data***.				
	SECTION A: GENERAL CONDITIONS OF CONTRACT				
A1	General (clause 1) F:..... V:..... T:.....	Item			
A2	Basis of Contract (clause 2) F:..... V:..... T:.....	Item			
A3	Engineer (clause 3) F:..... V:..... T:.....	Item			
A4	Contractor's General Obligation (clause 4) F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

DPW - ASBESTOS ERADICATION PROGRAMME
WIMS NO. 075988 - ST ANDREWS HOSPITAL
PROVISIONAL BILLS OF QUANTITIES

		UNIT	QUANTITY	RATE	AMOUNT
A5	Time and Related Matters (clause 5) - As referred to in the Contract Data under Special Condition of Contract. The Contract Period shall be deemed to include all Non – Working Days, Special Non – Working Days and the year-end Builders Annual Industry Holiday Periods.	Item			
	F:..... V:..... T:.....				
A6	Payment and Related Matters (clause 6)	Item			
	F:..... V:..... T:.....				
A7	Quality and Related Matters (clause 7)	Item			
	F:..... V:..... T:.....				
A8	Risk and Related Matters (clause 8)	Item			
	F:..... V:..... T:.....				
A9	Termination of Contract (clause 9)	Item			
	F:..... V:..... T:.....				
A10	Claims and Disputes (clause 10)	Item			
	F:..... V:..... T:.....				
	SECTION B: SANS 1921-1:2004 (Edition 1): CONSTRUCTION AND MANAGEMENT REQUIREMENTS FOR WORKS CONTRACTS: PART 1				
	Refer to the SCOPE OF WORK for detail requirements:				
B1	Scope				
	F:..... V:..... T:.....	Item			
B2	Normative references				
	F:..... V:..... T:.....	Item			
B3	Definitions				
	F:..... V:..... T:.....	Item			
B4	Requirements for construction and management				
	F:..... V:..... T:.....	Item			
B4.1	General				
	F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

DPW - ASBESTOS ERADICATION PROGRAMME
WIMS NO. 075988 - ST ANDREWS HOSPITAL
PROVISIONAL BILLS OF QUANTITIES

		UNIT	QUANTITY	RATE	AMOUNT
B4.2	Responsibilities for design and construction F:..... V:..... T:.....	Item			
B4.3	Planning, programme and method statements F:..... V:..... T:.....	Item			
B4.4	Quality assurance F:..... V:..... T:.....	Item			
B4.5	Setting out F:..... V:..... T:.....	Item			
B4.6	Management and disposal of water F:..... V:..... T:.....	Item			
B4.7	Blasting F:..... V:..... T:.....	Item			
B4.8	Works adjacent to services and structures F:..... V:..... T:.....	Item			
B4.9	Management of the Works and site F:..... V:..... T:.....	Item			
B4.10	Earthworks F:..... V:..... T:.....	Item			
B4.11	Testing F:..... V:..... T:.....	Item			
B4.12	Materials, samples and fabrication drawings F:..... V:..... T:.....	Item			
B4.13	Equipment F:..... V:..... T:.....	Item			
B4.14	Site establishment F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

DPW - ASBESTOS ERADICATION PROGRAMME
WIMS NO. 075988 - ST ANDREWS HOSPITAL
PROVISIONAL BILLS OF QUANTITIES

		UNIT	QUANTITY	RATE	AMOUNT
B4.15	Survey control F:..... V:..... T:.....	Item			
B4.16	Temporary works F:..... V:..... T:.....	Item			
B4.17	Existing services F:..... V:..... T:.....	Item			
B4.18	Health and safety F:..... V:..... T:.....	Item			
B4.19	Environmental requirements F:..... V:..... T:.....	Item			
B4.20	Alterations, additions, extensions and modifications to existing works F:..... V:..... T:.....	Item			
B4.21	Inspection of adjoining structures, services, buildings and property F:..... V:..... T:.....	Item			
B4.22	Attendance on nominated and selected subcontractors F:..... V:..... T:.....	Item			
	SECTION C: SCOPE OF WORK In accordance with SANS 10403 *(The reference to Clauses refer to Table B.1 of SANS 1921-1:2004)*				
C1	Certification by recognised bodies - CLAUSE 4.4 F:..... V:..... T:.....	Item			
C2	Agrément certificates - CLAUSE 4.5 F:..... V:..... T:.....	N/A			
C3	Other services and facilities - CLAUSE 4.8 F:..... V:..... T:.....	Item			
C4	Recording of weather - CLAUSE 5.2 F:..... V:..... T:.....	Item			
C5	Management meetings - CLAUSE 5.3 F:..... V:..... T:.....	Item			
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		UNIT	QUANTITY	RATE	AMOUNT
C6	Daily records CLAUSE 5.6 F:..... V:..... T:.....	Item			
C7	Bond and guarantees - CLAUSE 5.7 F:..... V:..... T:.....	Item			
C8	Permits - CLAUSE 5.9 F:..... V:..... T:.....	Item			
C9	Proof of compliance with the law - CLAUSE 5.10 F:..... V:..... T:.....	Item			
	SECTION D: SPECIFICATION DATA ASSOCIATED WITH SANS 1921-1:2004 (Table A.1)				
D1	Requirements for drawings, information and calculations for which the contractor is responsible CLAUSE 4.1.7 F:..... V:..... T:.....	Item			
D2	The responsibility strategy assigned to the contractor for the works CLAUSE 4.2.1 F:..... V:..... T:.....	Item			
D3	The planning, programme and method statements - CLAUSE 4.3 F:..... V:..... T:.....	Item			
D4	Samples of materials, workmanship and finishes - CLAUSE 4.12.1 F:..... V:..... T:.....	Item			
D5	Fabrication drawings that the contractor is to provide and deliver to the employer - CLAUSE 4.12.2 F:..... V:..... T:.....	Item			
D6	Office for the foreman CLAUSE 4.14.3 F:..... V:..... T:.....	Item			
D7	Telephone - CLAUSE 4.14.3 F:..... V:..... T:.....	Item			
D8	Office for inspector of works - CLAUSE 4.14.3 F:..... V:..... T:.....	Item			
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		UNIT	QUANTITY	RATE	AMOUNT
D9	Telephone in office for inspector of works - CLAUSE 4.14.3 F:..... V:..... T:.....	Item			
D10	Sheds - CLAUSE 4.14.3 F:..... V:..... T:.....	Item			
D11	Provision and erection of signboards - CLAUSE 4.14.6 F:..... V:..... T:.....	Item			
D12	Termination, diversion or maintenance of existing services - CLAUSE4.17.1 F:..... V:..... T:.....	Item			
D13	Services which are known to exist - CLAUSE 4.17.3 F:..... V:..... T:.....	Item			
D14	Detection apparatus - CLAUSE 4.17.4 F:..... V:..... T:.....	Item			
D15	Additional health and safety requirements - CLAUSE 4.18 F:..... V:..... T:.....	Item			
	SECTION E: SPECIFIC PRELIMINARIES Section E contains Specific Preliminary items which apply to this contract except where "N/A" (Not Applicable) appears against the item.				
E1	**PROPRIETARY BRANDED PRODUCTS** The contractor shall take delivery of, handle, store, use apply and/or fix all proprietary branded products in strict accordance with the manufacturers' instruction after consultation with the manufacturer's authorised representative. F:..... V:..... T:.....	Item			
E2	**OVERTIME** Should overtime be required to be worked for any reason whatsoever, the costs of such overtime are to be borne by the Contractor unless the Engineer/Principal Agent has specifically authorised in writing, prior to the execution thereof, that costs for such overtime are to be borne by the Employer. F:..... V:..... T:.....	Item			
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	SECTION E: SPECIFIC PRELIMINARIES	UNIT	QUANTITY	RATE	AMOUNT
E3	**AS BUILT DRAWINGS** The position of construction breaks and the extent of individual concrete pours are to be recorded by the Contractor on the Structural Engineer's drawings and are to be submitted to the Engineer/Principal Agent and the Structural Engineer for their records. F:..... V:..... T:.....	Item			
E4	**SITE INSTRUCTIONS** Site Instructions issued on site are to be recorded in triplicate in a Site Instruction book which is to be maintained on site by the Contractor. F:..... V:..... T:.....	Item			
E5	**LABOUR RECORD** At the end of each week the Contractor shall provide the Engineer/Principal Agent with a written record, in schedule form, reflecting the number and description of tradesmen and labourers employed by him and all sub-contractors on the works each day. F:..... V:..... T:..... *Note: In the event that the contractor fails to satisfy the requirements of this specification, the Employer (Head: Public Works) may apply any of the sanctions provided in the contract. Sanctions may include the application of a financial penalty of .04% of the Contract Sum per calendar day of which the required report has not been submitted.*	Item			
E6	**PLANT RECORD** At the end of each week the Contractor shall provide the Engineer/Principal Agent with a written record, in schedule form, reflecting the number, type and capacity of all plant, excluding hand tools, currently used on the works. F:..... V:..... T:.....	Item			
E7	**NON CESSION OF MONIES** The Contractor shall not cede nor assign his rights or claims to any monies due or to become due under this contract. F:..... V:..... T:.....	Item			
E8	**SECTIONAL COMPLETION** When it is required that the contract be executed in sections or portions, the tenderer shall allow for all costs in this regard as no claim for additional costs will be entertained. F:..... V:..... T:.....	Item			
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	SECTION E: SPECIFIC PRELIMINARIES	UNIT	QUANTITY	RATE	AMOUNT
E9	**LOCAL LABOUR** It is a general requirement of this contract that persons normally resident in the locality of the works (Local Labour) be given preference for employment on the contract. Provided, however, that should adequate and appropriate Labour not be available within the locality, others may be employed subject to satisfactory proof being provided that every reasonable endeavour has been made to employ Local Labour. The Contractor shall identify the local community leaders with the purpose of negotiating with them regarding the utilization of Local Labour in the construction process. In this regard, the Contractor shall furthermore give preference, wherever possible to the employment of single heads of households, women and youth. The Contractor shall, in general, maximize the involvement of the local community. F:..... V:..... T:.....	Item			
E10	**IMPORT PERMITS AND DUTIES** The responsibility for obtaining the necessary import permits shall rest with the successful Tenderer. No foreign exchange will be arranged or provided by the Administration. Tenderers are to allow in their tenders and pay the ordinary levy imposed on imported items in terms of item 196.10 of Part 8 of Schedule No. 1 of the Customs and Excise Act, 1964 with effect from 1 October 1989. F:..... V:..... T:.....	Item			
E11	**CONTRACT PRICE ADJUSTMENT PROVISIONS (CPAP)** Notwithstanding anything to the contrary contained in the GCC for Construction Works 2010 2nd Edition, this Contract shall only when the Construction Period exceeds 6 months and the Contract sum exceeds R1,000,000,00 be subject to the Contract Price Adjustment Provisions Indices Application Manual for use with P0151 indices (CPAP) (Revised 1 January 2013) as published by Statistics South Africa. Tenderers are advised that with reference to Clause 3.4.6 of the Contract Price Adjustment Provisions (CPAP) Indices Applications Manual, the Head: Public Works ***will not accept the submission by Tenderers of lists of additional items.*** Where this contract is a Lump Sum contract, the contract will be subject to Contract Price Adjustment Provisions (CPAP) only where the contract period equals or exceeds 6 calendar months. The applicable work group shall be WG 180 for domestic buildings or WG 181 for commercial and industrial buildings. F:..... V:..... T:.....	Item			
E12	**EPWP CONDITIONS AND SPECIFICATIONS** **12.1 EMPLOYMENT TARGETS** E12.1 a Employment Targets The contractor needs to provide a realistic estimate on the number of jobs that the project has a potential to create throughout the project duration as the project will be implemented using Labour Intensive Construction methods on elements where it is economical and feasible. Number of jobs estimated to be created is a minimum of **2 beneficiaries.** No of jobs to be created = ... *[Contractor to fill in an estimated number]* F:..... V:..... T:.....	Item			
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	It is a general requirement of this contract that persons normally resident in the ward of the works (local labour) be given preference for employment on the contract. Provided, however, that **should adequate and appropriate labour not be available within the ward**, others may be employed subject to satisfactory proof being provided that every reasonable endeavour has been made to employ local labour **(Local Sub-contractor(s); Skilled; Semi-Skilled and Unskilled)**. The contractor shall in consultation with the local community leaders **(Project Steering Committee)** with the purpose of negotiating with them regarding the utilization of local resources in the construction process. In this regard, the contractor shall furthermore give preference, wherever possible to the employment of single heads of households, women and youth as well as families declared as most indigent by War on Poverty/ Sukuma Sakhe program profiling process. The contractor should aim, in general, to maximise the involvement of the local community, however workers from other communities should not exceed 20% of all persons working on the project, where local employees possess skills at level of competency that meet contractor's requirements.				
	E12.1 b Employment requirements Tenderers are advised that this contract will be subject to the Expanded Public Works Program (EPWP) aimed at alleviating and reducing unemployment. Tenderers must allow for any costs for the following employment requirements of the EPWP 1. 60% of unskilled labour to be women 2. 55% of unskilled labour to be youth aged between 18 and 35 years 3. 2% of unskilled labour to be people with disability 4. 100% unskilled labour utilized must reside within the boundaries of the Municipality Ward where this contract is executed, with preference to the local community closest or a walking distance to the contract site. Wherever possible local skilled tradesmen are to be employed on this contract with the view to maximize utilization of local resources F:..... V:..... T:.....	Item			
	E12.1 c Labour rate and payment intervals The contractor should ensure that the labour rate paid to unskilled local labour is commensurate to the daily task. When determining the rate, consideration should be given to that EPWP beneficiaries are mostly bread winners in their families, as the program intends alleviating poverty. There should also be consideration that the labour rate promotes creation of expanded number of jobs created and person days of work. Contractors should make endeavours to ensure that labourers, particularly unskilled are remunerated on fortnight basis and prior notification be made should there be a shortfall on their wages. The labour rate for local unskilled shall also be determined in consideration of the location of the project, i.e. for projects implemented in urbanized municipalities will not be the same as that for rural municipalities. F:..... V:..... T:.....	Item			
	12.2 LABOUR INTENSIVE CONSTRUCTION METHOD E12.2 a Labour Intensive Construction (LIC) method On site there must a person(s) having competency in managing and implementing LIC methods. *Foreman @ NQF Level 4 the Unit Standard on Implementing LIC methods on site. *Site Agent/ Managers @ NQF level 5 the Unit Standard on Manage Labour-Intensive Skills Programme both must be CETA accredited F:..... V:..... T:.....	Item			
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	E12.2 b Labour Intensive Construction Method Those parts of the contract to be constructed using Labour Intensive methods will be marked in the BoQ with letter LI (indicating Labour Intensive) against every item so designated. Such works will only be constructed using method so indicated. Reference to be made to Guidelines for the implementation of Labour Intensive Infrastructure projects under EPWP. "Scope of Work in Respect of Work Relating to the Expanded Public Works Programme (EPWP)" **Labour-Intensive component** Due to the nature of the work involved, this type of project lends itself to be feasible as a labour intensive project i.e. the construction activities will indeed require skilled/unskilled labour. The aim of the projects is to provide some form of economic benefit whilst generating and increasing the acquired skills shortage to improve sustainability in the local area. The following are potential focus areas where employment creation can be optimized per project: (i) Trenching works not exceeding depth of 1.5m, including trenching for Foundation, Electrical, Water, Mechanical & Civil Services Works including backfilling where ground conditions permit (ii) Building Works; All masonry works (which include concrete mixing on site; brickwork; block work ; plastering; screed works; jointing; etc.); Painting, Plumbing, Ironmongery; roof cladding; glazing; tilling; carpentry; flooring; waterproofing; etc. (iii)Sewers works including Construction of manholes, laying of Sewer pipes, bedding, backfilling and compaction. (iv) Water Reticulation works including excavation, bedding, laying of pipes and compaction (v) Site Clearance Works (vi) Electrical Reticulation works. (vii) Stormwater water drainage using in-situ concrete (viii) Landscaping and Grassing of Sports Field (ix) Cleaning and Fencing Works F:..... V:..... T:.....	Item			
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		UNIT	QUANTITY	RATE	AMOUNT
	The above identified activities are deemed suitable to be constructed using the LIC methods; to build, upgrade and maintain the social and economic of the underdeveloped area, promoting community participation, development of skills and creating more work opportunities The above identified activities should be marked in the Bill of Quantities with the letter (LI). Contractor to price the above items in the Bill of Quantities bearing in mind that they are regarded as the main sources of job creation, whether sub contracted or undertaken by the main contractor. The use of plant to provide such works, other than plant specifically provided for in the scope of work, is a variation to the contract. The items marked with the letter LI are not necessarily an exhaustive list of all the activities which must be done by hand. Payment for items which are designated to be constructed labour-intensively (either in this schedule or in the Scope of Works) will not be made unless they are constructed using labour-intensive methods. Any unauthorised use of plant to carry out work which was to be done labour-intensively will not be condoned and any works so constructed will not be certified for payment. F:..... V:..... T:.....	Item			
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	E12.3 RECORD KEEPING 12.3.1 Every employer must keep in the project site office the following minutes of site progress minutes; contractors' monthly site progress reports; accurately recorded attendance register; proof of payment as means to verify authenticity of data in the EPWP Beneficiary form submitted with payment certificates. Copies of submitted EPWP beneficiary data forms should also be kept in the site office. F:..... V:..... T:.....	Item			
	12. 3.2 The employer must keep this record for a period of at least three (3) years after the completion of the project in his/her office as the project site office would have been relocated. This should be safely kept for job creation data verifications and periodical audits on projects conducted by National and Provincial Department of Public Works after one (1) or two (2) quarters of submitting captured EPWP Data to the National EPWP coordinating Department. F:..... V:..... T:.....	Item			
	E12.4 EPWP REPORTING as per EPWP DATA FORM At the end of each month the contractor must submit: •EPWP monthly data collection form •Worker monthly payment upload •Worker monthly acknowledgement of receipt of payment •Worker monthly Payment register •Worker monthly training form •Monthly attendance Register •Worker Monthly pay slips •Unskilled labour certified ID copies (once off) •Beneficiary ID-size photos •Proof of UIF •Proof of COIDA F:..... V:..... T:.....	Item			
	E12.5 EPWP PROMOTION <u>12.5.1 EPWP signage board</u> EPWP Program at the project level shall always be promoted through the provision of projects signage board that embraces EPWP logo at the bottom, correct measurement for this sign board will be provided by the project leader during the site handing over meeting. F:..... V:..... T:.....	Item			
	<u>12.5.2 Branding of labour apparel</u> Contractor & Sub-contractors' labourers shall be provided with EPWP branded Personal Protective Equipment (PPE), reflector vest with EPWP acronym at the back as an ideal and cost effective means of promoting program on site. The contractor is then advised to price for both item 12.5.1 and 12.5.2 F:..... V:..... T:.....	Item			
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	E12.6 COMMUNITY LIAISON OFFICER (CLO) UTILISATION OF A COMMUNITY LIAISON OFFICER The Contractor shall allow for and pay any and all costs necessary for the engagement of the services of a Community Liaison Officer (CLO) for the full duration of this contract A CLO will be identified by the local structures (Project Steering Committee) of the ward areas and appointed following fair and transparent interviewing process, to be conducted in the presence of local structures and the contractor representative, in order to assist the Contractor in the procurement of any local labour, etc. required for this project. The Contractor is to liaise with the CLO and afford him any assistance needed in ensuring sound working relations with the local community. **Key Responsibilities of the CLO are envisaged to include and not necessary be limited to:** 1. Assisting local leadership in conducting skills and resources audit which facilitates sourcing labour from within the ward or targeted areas for employment, as required by contractor 2. Assisting in sourcing labour-only domestic sub-contractors and the procurement of materials from local resources, as required by the contractor. 3. Assisting the contractor by identifying areas of potential conflict and or threats to the project or to stakeholders in the project and recommend appropriate action to the contractor. 4. Assisting contractor and stakeholders in the project in the resolution of any conflict which may arise. 5. Establishing and ensuring that sufficient and open communication channels between the contractor and the work force are maintained. 6. Establish and ensuring that efficient and open communication channels between the contractor and the community are maintained 7. Identifying and reporting to the Contractor regarding issues where communication between stakeholder is necessary, recommend courses of action and facilitate such communications 8. Assisting the Contractor and the work force in the establishment of grievance procedures and necessary recommendation to the Contractor regarding the grievances and solution thereto. 9. Attending to site meetings and project implementation meetings as required by the Contractor and prepare and submit periodic reports as may be required by the Contractor from time to time. 10. Attending to such other duties which are consistent with the functions of a CLO, as may be required by the Contractor from time to time. Tenderers are to price twice the rate of unskilled local labour rate for the Community Liaison Officer (CLO) ,all costs arising out of compliance with the foregoing and in the event of a Tenderer failing to price against this item or making inadequate financial provision against this item for compliance as aforesaid, then no claim for costs or additional cost incurred will be entertained by the Head: Public Works F:..... V:..... T:.....	Item			
	E12.7 SKILLS DEVELOPMENT ON SITE The Contractor is conforming to the objectives of EPWP if his beneficiaries are capacitated with skills that will render them employable in the future. It is then the responsibility of the contractor that mandatory life skills are provided to 100% of workforce on site and on the job training to labourers from whom the potential for further development has been identified. The latter is not mandatory to all as it covers technical skills.				
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	Contractor should also make provision for the possibility that there might be local youth that will need to be placed on the project with an intention to be provided support towards improving their level of competency and productivity. Contractor shall also provide all necessary on-the-job training to targeted labour to enable such labour to master and advance on techniques required to undertake the work in accordance with requirements of the contract in a manner that does not compromise workers health and safety. F:..... V:..... T:.....	Item			
	E12.8 SUB CONTRACTING FOR LOCAL EMERGING ENTERPRISES The project can support the notion of one main contractor to be appointed whilst several subcontractors, possibly from the local Small, Medium and Micro Enterprises (SMME) group, are employed to undertake various smaller activities. Two alternatives can be applied for setting out work for sub-contractors, i.e. full responsibility (provide their own plant, materials and labour) or secondly the main contractor remains responsible for the supply of plant and materials, while the sub-contractor is responsible for implementation, thus providing the skills and labour content only for the various construction activities. The contractor will be required to appoint a reasonable number of emerging sub-contractors to undertake work to the minimum of **5%** of the contract value on the various service areas but not limited to the following services; Item — Description/Task/Activity General Building works: — Masonry Carpentry and joinery Floor finishes/ tiling Paint work Joinery fittings Plumbing & Drainage (internal & external) Plastering Civil Works: — Paving Landscaping This percentage excludes the costs of employing local unskilled labour. A minimum of **5%** of the total number of the appointed emerging subcontractors must be owned by **females** who have more than **50.1%** ownership of their company/organization. SMME represent an important vehicle to address the challenges of job creation, economic growth and equity in our country. SMMEs are playing a critical role in absorbing labour, penetrating new markets and generally expanding economies in creative and innovative ways. F:..... V:..... T:.....	Item			
	E12.8.1 Subcontractor Procedure The recommendation will be that the Contractor shall advertise and call for competitive tenders in respect of each portion of the works that are required to be subcontracted. The tenders received are then evaluated by both the employer and the contractor. The evaluation panel shall comprises equal representatives from the Employer and from the Contractor The Contractor shall without delay enter into contract with the successful tendering subcontractor based on their accepted tender submission.				
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	This will promote the cost effective participation and development of smaller registered contractors in larger valued contracts without losing single point of accountability for projects. This will allow the emerging contractors to tender for work in a fair, transparent and equitable manner rather than having to negotiate such contracts with the main contractor. Also guarantees the participation of contractors registered in lower contractor grading designation.				
	F:..... V:..... T:.....	Item			
	E12.8.2 Subcontractor Mentoring Once the Subcontractors have been identified and engaged, the Contractor shall closely monitor their performance in the execution of their contracts. The Contractor will be responsible for drawing implementation plan that will assist in managing the development of sub-contractors undertaking Labour Intensive work. The Contractor will be responsible for management of the sub-contractors and to ensure that they comply with all EPWP requirements as set-out in this specification. The Contractor and sub-contractors will be required to compile monthly progress reports to be submitted with payment certificates. The reports shall include planned targets with regards to the works and employment, employment of EPWP beneficiaries and project expenditure. Failure to produce monthly reports will render payment certificates incomplete The contractor will be required to assist, train, mentor and monitor its Sub-contractors and report through monitoring tool on progress of each Sub-contractor.				
	F:..... V:..... T:.....	Item			
	E12.8.3 Portfolio of Evidence The Contractor is to develop and /or maintain a portfolio of evidence for each sub-contractor. The Portfolio of Evidence is a collection of proof of the training, coaching, guidance and monitoring inputs provided to the Sub-contractor. It is the document which records the development progress of the Sub-Contractor and will need to be updated continually throughout the duration of the contract. The Portfolio of Evidence should include but not limited to the following documentation: •The development path designed for each Sub-Contractor, •The Training course completed by the Sub-Contractor, •The hours of guiding, coaching and mentoring received for each activity listed in the developmental plan, •A list of outcomes achieved at each level for each activity. **Performance and penalties** The Contractor performance will be monitored throughout the contract. Should the Contractor fail to fulfil his obligation he will be liable for penalties. Payment of the penalty shall not absolve the Contractor of any claim, or relieve the Contractor of any of his duties, obligations or responsibilities under the contract. •Utilisation of the Sub-Contractors The Contractor's achievement of the targets will be measured quarterly to determine the progress made to date. **E12.8.4 Local Suppliers** Local material suppliers within the vicinity of the site to be utilise as long as their materials meets the required specification. However, quality and suitability would have to be checked by the employer, if the local suppliers are unable to meet the demand the nearest suitable suppliers are to be used. Production of materials should be done on site, where economies of scale allow e.g. concrete paving blocks should be encouraged which will enable employment creation and also allow for enterprise development.				
	F:..... V:..... T:.....	Item			
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	E12.8.5 Tenders To Note Conditions a) The contract to be entered into between the Contractor and the Priority Population Group's (PPG's) will be a labour and material sub-contract or labour only depending on the contractor and subcontractor agreement. b) The Contractor will be responsible for ensuring that all materials for use by the PPG's in the works are to be on site timeously. The Contractor shall liaise with The Mentor and PPG to determine the nature and extent of materials required and the lead time necessary. F:..... V:..... T:..... c) The Contractor shall be responsible for the overall programming of the Works and he is to allow for monitoring the PPG's programme and progress. d)In conjunction with the Mentor, he is to allow for the supervision and mentoring (where necessary) of the PPG to ensure quality and adherence to standard building practice F:..... V:..... T:..... e) The Contractor is to allow for extra storage facilities on site for the PPG's tools and equipment. F:..... V:..... T:..... f)Basic tools shall be provided by the Priority Population Group's (PPG's) and where these are not available; the Contractor will supply him with the necessary tools and equipment and deduct the costs thereof from the interim claims made by the PPG. g) Work requiring specialized tools will be provided free of charge by the Contractor with the provision that these be returned upon completion of the Work CO-ORDINATION AND SUPERVISION The Contractor is to co-ordinate and supervise the work of all the PPG's, Sub-Contractors and Nominated Sub- Contractors appointed directly by the Employer in such a manner and at all times as will suit the building programme and he is to allow adequate access, for the PPG's, where required, to carry out their work in an efficient manner and acceptable quality standards in accordance with the specifications as no claims for extras in this connection will be entertained. F:..... V:..... T:..... ATTENDANCE The Contractor may allow for attendance upon the PPG's concerned to execute the work. The Contractor is to allow the PPG's the use of any scaffolding belonging to him while it remains so erected on the site. Where scaffolding is necessary for the use by any PPG and the Contractor has not erected any for his own use or has removed same after his own use, the Contractor shall supply sufficient scaffolding to the PPG to be erected and dismantled by the PPG and returned to the Contractor. This attendance upon PPG's to execute the work is to include for the scaffolding provisions as aforesaid and, in addition, is to include for co-operating to the fullest extent with all the parties, attending on off-loading materials, providing suitable storage for tools and materials used by the PPG's, use of general facilities such as latrines, etc., supply and cost of power, lighting, water and the like. F:..... V:..... T:..... **E12.9 EPWP CONTRACT FOR LABOUR** It is compulsory that shortly after the contractor and or subcontractor has appointed local labour, the employment contract should be signed by both parties, prior to commencement with works on site. The employment contract forms part of the Ministerial Determination or from the regional EPWP officials. F:..... V:..... T:.....	Item Item Item Item Item Item			
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	E12.10 EPWP SCOPE of WORK **Note:** Contractors are to price the items on the Bill of Quantities highlighted below, bearing in mind that they are regarded as main sources of job creation, whether subcontracted or undertaken by the main contractor. Elements of the scope of work where the application of Labour-Intensive Construction methods are indicated with the letters (LI) are as follows; i) Excavating trenches for foundations and any other civil works with the depth not more than 1.5 m ii) All masonry works which include concrete mixing on site; brickwork; plastering; screed works; jointing; etc. iii) Painting, Plumbing, Ironmongery; roof cladding; glazing; tilling; carpentry; flooring; waterproofing; etc. iv) External works such as landscaping; cleaning; paving; fencing; tarmac; etc.				
E13	**HIV/AIDS AWARENESS** Tenderers are to price against the following items for compliance with the SPECIFICATION FOR HIV/AIDS AWARENESS bound into this document (The clauses referred to are those of the Specification for HIV/AIDS)				
E13.1	Provide and maintain a condom dispenser in terms of Clause 5.1a) F:..... V:..... T:.....	Item			
E13.2	Provide and maintain HIV/AIDS awareness posters terms of Clause 5.1b) F:..... V:..... T:.....	Item			
E13.3	HIV /Aids Awareness Programme on Site for not less than 90% of workers inclusive of all direct and indirect costs; Engage a qualified service provider as described in the scope of works to conduct an HIV Awareness Programme in terms of Clause 5.2.1a) F:..... V:..... T:.....	Item			
E13.4	Arrange for workers to attend the HIV Awareness Programme in terms of Clause 5.2.1b) F:..... V:..... T:.....	Item			
E13.5	**Reporting** Prepare and attach to claims for payment a brief report in terms of Clause 5.3 (see also HIV/STI Compliance Report included with this document). F:..... V:..... T:..... ***Note: In the event that the contractor fails to satisfy the requirements of this specification, the employer (Head: Public Works) may apply any of the sanctions provided for in the contract. Sanctions may include the application of a financial penalty of .04% of the Contract Sum per calendar day of which the required reports has not been submitted.***	Item			
E14	**OCCUPATIONAL HEALTH AND SAFETY ACT NO. 85 OF 1993** Tenderers are to allow for costs in providing a project specific ' Construction Phase Safety, Health and Environmental Plan' in accordance with "Section 2 - Specification Data associated with SANS 1921-1:2004" clause C4.18 in "Part C3 - Scope of Work" F:..... V:..... T:.....	Item			
E15	**NOTICE BOARD, SITE OFFICE, ETC.** Tenderers are to allow for the provision and removal of a project notice board and a site office in accordance with the Principal Agent's requirements.				
	Carried forward to collection			R	

DPW - ASBESTOS ERADICATION PROGRAMME
WIMS NO. 075988 - ST ANDREWS HOSPITAL
PROVISIONAL BILLS OF QUANTITIES

		UNIT	QUANTITY	RATE	AMOUNT
	F:..... V:..... T:.....	Item			
E16	**IMPORTED MATERIALS AND EQUIPMENT** Where imported items are listed in the tender documents, the tenderer shall provide all information called for, failing which the price of any such item, material or equipment shall be excluded from currency fluctuations. (***Refer to T2.14 - Schedule of Imported Materials and Equipment***.				
	F:..... V:..... T:.....	Item			
E17	**CONTRACT DOCUMENTS** The drawings issues with these Tender documents do not comprise the complete set but serves as a guide only for tendering purposes and for indicating the scope of works to enable the Tenderer to acquaint him with the nature and extent of the works and the manner in which they are to be executed. Should any part of the drawings not be clearly legible to the Tenderer he shall, before submitting his Tender, obtain clarification in writing from the principal agent.				
	F:..... V:..... T:.....	Item			
E18	**GENERAL PREAMBLES** The Document Preambles will be the "DOH - Standard Preambles to All Trades; Revision 3 January 2009" and is obtainable from the various Regional Office's of the Department of Public Works and shall be read in conjunction with the Bills of Quantities and be referred to for the full descriptions of work to be done and materials to be used.				
	F:..... V:..... T:.....	Item			
E19	**TRADE NAMES** Wherever a Trade Name for any product has been described in the Bills of Quantities the Tenderer's attention is drawn to the fact that any other product of equal quality may be used subject to the written approval of the Principal Agent being obtained prior to the closing date for submission of Tenders.				
	F:..... V:..... T:.....	Item			
E20	**EXISTING PREMISES OCCUPIED** Refer to Scope of Works Part C3 of this Tender Document for information on the occupation of existing buildings.				
	F:..... V:..... T:.....	Item			
E21	**INACCURATE AND DEFECTIVE WORK EXECUTED UNDER PREVIOUS CONTRACT** The contractor shall, after taking possession of the site and before commencing the work, check all levels, liners, profiles and the like and satisfy himself as to the dimensional accuracy of all work executed under the previous contract which may affect his work. Should any inaccurate or defective work be found, the contractor shall immediately notify the principal agent in writing requesting his instructions with regard thereto and afford every facility to those rectifying such inaccurate or defective work.				
	F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

DPW - ASBESTOS ERADICATION PROGRAMME
WIMS NO. 075988 - ST ANDREWS HOSPITAL
PROVISIONAL BILLS OF QUANTITIES

		UNIT	QUANTITY	RATE	AMOUNT
E22	**VIEWING THE SITE IN SECURITY AREAS** If the site is situated in a security area and the Tenderder must arrange with the Authorities to obtain permission to enter the site for Tenderding purposes. F:..... V:..... T:.....	Item			
E23	**COMMENCEMENT OF WORKS IN SECURITY AREAS** If the works falls within a security area, the contractor must arrange with the Authorities and give the necessary notices before commencement of the works. Should the contractor fail to make such arrangements, admission to the site may be refused and any additional costs will be for the contractor's account. F:..... V:..... T:.....	Item			
E24	**ENTRANCE PERMITS TO SECURITY AREAS** If the works fall within a security area, the contractor shall obtain entrance permits for his personnel and workmen entering the area and shall comply with all regulations and instructions which may be issued from time to time regarding the protection of persons and property under control of the Authority. F:..... V:..... T:.....	Item			
E25	**SECURITY CHECK OF PERSONNEL** The principal agent may require the contractor to have his personnel and workmen, or a certain number of them, security classified. In the event of the principal agent requesting the removal of a person or persons from the works for security reasons, the contractor shall do so forthwith and shall thereafter ensure that such person or persons are denied access to the works and the site and/or to any document or information relating to the works. F:..... V:..... T:.....	Item			
E26	**PROHIBITION ON TAKING PHOTOGRAPHS** In terms of article 119 of the Defence Act, 44 of 1957, it is prohibited to sketch or to take photographs of any military site or installation or any building or civil works thereon or to be in possession of a camera or other apparatus used for taking photographs, except when authorised thereto by or on behalf of the Minister. The same prohibition is also applicable to all Correctional Institutions in terms of article 44.1(e) of the Correctional Services Act 8 of 1959. F:..... V:..... T:.....	Item			
E27	Management of Water Water for Construction purposes must be obtained from alternative water sources (i.e. supply other than water that is produced and distributed by a regulated water service authority from a licensed water treatment works for human consumption), eg. dams, rivers, boreholes, springs, rainwater harvesting, recycled sewerage water,etc. The alternative water source shall not be of an inferior quality / standard than that required for construction purposes. The client reserves the right through his agents to test such supplies or request certificates confirming the grade and nature of the water supply. Relevant knowledge of the respective area will be an advantage. The Contractor is to ensure that an adequate and consistent water supply is accessible in areas wherein there are constant water disruptions and/or no water at all. Any costs associated with ensuring the constant supply of water should be priced under this item as no claims will be entertained during construction. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

DPW - ASBESTOS ERADICATION PROGRAMME
WIMS NO. 075988 - ST ANDREWS HOSPITAL
PROVISIONAL BILLS OF QUANTITIES

		UNIT	QUANTITY	RATE	AMOUNT
E27	MANAGEMENT OF ELECTRICITY The Contractor is to ensure that a back up generator is also made available for the purposes of construction in the event of power outages. Any costs associated with ensuring the this should be priced under this item as no claims will be entertained during construction. F:..... V:..... T:.....	Item			
	Carried forward to collection			R	

DPW - ASBESTOS ERADICATION PROGRAMME
WIMS NO. 075988 - ST ANDREWS HOSPITAL
PROVISIONAL BILLS OF QUANTITIES

SECTION 1

SUMMARY – PRELIMINARY & GENERAL

Collection	Page No.	Amount
	1	R
	2	R
	3	R
	4	R
	5	R
	6	R
	7	R
	8	R
	9	R
	10	R
	11	R
	12	R
	13	R
	14	R
	15	R
	16	R
	17	R
	18	R
	19	R
	20	R
Carried forward to Final Summary		R

Section No. 1
Preliminary & General
Summary

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

PART C2.3 BILL OF QUANTITIES

Item No		Quantity	Rate	Amount
	SECTION 2			
	BILL NO. 1			
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades			
	ALTERATIONS AND DEMOLITIONS (PROVISIONAL)			
	(CPAP WORK GROUP NO. 102 UNLESS OTHERWISE STATED)			
	SUPPLEMENTARY PREAMBLES			
	View site			
	Before submitting his tender the contractor shall visit the site and satisfy himself as to the nature and extent of the work to be done and the value of the materials contained in the buildings or portions of the buildings to be demolished. 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			
	Explosives			
	No explosives whatsoever may be used for demolition purposes unless otherwise stated			
	Taking Out and Removal of Asbestos			
	Taking out and removing asbestos roof, gutters, underlay, fibreglass, downpipes, ect. must be in strict accordance with health and occupational safety regulations and a specialist firm must be contracted to dispose of the material and the required asbestos safe disposal certificates must be provided after disposal to the Principal Agent			
	Carried Forward		R	

Brought Forward			R
General			
Descriptions of taking out shall be deemed to include carting away from site to a dump ground to be found by the contractor			
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 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			
Water supply pipes and other piping that may be encountered and found necessary to disconnect or cut, shall be effectually stopped off or grubbed up and removed, and any new connections that may be necessary shall be made with proper fittings, to the satisfaction of the principal agent			
Doors, fanlights, fittings, frames, linings, etc which are to be re-used shall be thoroughly overhauled before refixing including taking off, easing and rehanging, cramping up, re-wedging as required and making good cramps, dowels, etc, and easing, oiling, adjusting and repairing ironmongery as necessary, replacing any glass damaged in removal or subsequently and stopping up all nail and screw holes with tinted plastic wood to match timber, unless otherwise described. Re-painting or re-varnishing is given separately			
Prices for taking out of doors, windows, etc shall include for removal of all beads, architraves, ironmongery, etc			
With regard to building up of openings in existing walls, cement screeds and pavings, granolithic, tops of walls, etc, shall be levelled and prepared for raising of brickwork			
Making good of finishes shall include making good of the brick and concrete surfaces onto which the new finishes are applied, where necessary			
Carried Forward			R

				R
	Brought Forward			
	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)			
	The Contractor to acknowledge that sequencing of the work will be necessary to accomodate the operational aspects of the school. The Contractor to accordingly factor the above requirement in the construction programme and pricing			
	REMOVAL OF EXISTING WORK			
	Breaking up and removing existing concrete work, including cutting and removing reinforcement			
1	80mm Thick stormwater apron	m2	33	
2	100mm Concrete surface bed	m2	19	
	Breaking down and removing brickwork etc			
3	Half brick walls in beamfilling	m2	7	
4	Half brick walls to form new roof level	m2	9	
5	One brick walls in beamfilling	m2	11	
	Taking down and removing roofs, floors, panelling, ceilings, partitions, etc completely (new elsewhere measured) including carting away			
6	Asbestos roof sheeting including timber rafters, etc complete, including provision of certificate of Safe Disposal for asbestos	m2	1,757	
7	Translucent roof covering, including support structure, etc complete	m2	14	
8	Gypsum plasterboard ceilings including cornices, etc.	m2	560	
9	Timber rafters, including carting away offsite	m2	42	
10	Timber shiplapping from walls (gable ends)	m2	10	
	Carried Forward			R

				R
	Brought Forward			
11	Asbestos fascia boards and fixings, including provision of certificate of Safe Disposal for asbestos	m	384	
12	Asbestos barge boards and fixings including provision of certificate of Safe Disposal for asbestos	m	189	
13	Asbestos rainwater gutters and fixings including provision of certificate of Safe Disposal for asbestos	m	336	
14	Safe handling of asbestos material removed from the buildings, including providing protection, hoarding, etc. of areas with asbestos. All to the satisfaction of the Approved Inspector Authority (AIA).		Item	
	Taking out and removing sundry timber work, etc, including carting away off site			
15	Existing timber beam	m	230	
	Hacking up and removing floor coverings, carpets, etc. including removing mortar bed and/or adhesives and supplementary layers from concrete or brickwork and preparing surfaces for new screed, etc. (elsewhere measured)			
16	Vinyl tile floor covering.	m2	41	
	Hacking up and removing granolithic, screeds, plaster, etc. from concrete or brickwork and preparing surfaces for new screeds, plaster, etc. (elsewhere measured) including carting away rubble off site			
17	Average 4mm thick torch-on waterproofing, including screed to flat roof and cart away rubble off site	m2	20	
	Taking out and removing glass, mirror, etc			
18	Glass from steel windows including cleaning out rebates and preparing for new glass (new glass elsewhere measured).	m2	5	
	Carried Forward			R

	Brought Forward			R
	CAREFULLY TAKE OUT / OFF AND SET ASIDE FOR RE-USE AND RE-FIX INCLUDING MAKING GOOD			
	Taking out and removing, setting aside, cleaning and store for re-use and later refixing in new or similar position			
19	Timber rafter, including storing on site for reuse	m	35	
20	Existing stainless steel sink, including cupboard, approximate size 3300 x 900mm high and storing on site for reuse	No	1	
21	Existing wash hand basin and storing on site for reuse	No	1	
22	Existing steel window, approximate size 1000 x 1000mm, including storing on site for reuse	No	1	
	Re-fixing of items previously set aside in new or similar position			
23	Timber rafter, including necessary hangers, etc.	m	35	
24	Existing stainless steel sink previously set aside, including cupboard, approximate size 3300 x 900mm high	No	1	
25	Existing wash hand basin previously set aside, including silicon sealant at the junction of wall and basin	No	1	
26	Existing steel window previously set aside, approximate size 1000 x 1000mm	No	1	
	OPENINGS THROUGH EXISTING WALLS, ETC.			
	BUILDING UP OPENINGS			
	Brickwork in NFP bricks in class II mortar in building up openings including bonding new brickwork to existing and making good cement plaster on one side (making good paintwork elsewhere measured)			
27	Building up of openings in one brick walls.	m2	10	
	Carried Forward			R

				R
	Brought Forward			
	MAKING GOOD OF FINISHES, ETC.			
	One brickwork, including making good plaster and paint finishes to both sides			
28	Patching in beamfilling, including making good finishes (Plaster and paintwork measured elsewhere)	m2	115	
	Making good smooth internal cement plaster			
29	Walls in beamfilling	m2	115	
30	Walls in patches.	m2	10	
	Making good smooth external cement plaster			
31	Walls in beamfilling	m2	115	
32	Walls in patches.	m2	10	
	BRICKWORK SUNDRIES			
	Brickwork reinforcement			
33	150mm Wide reinforcement built in horizontally	m	396	
	TEMPORARY PROTECTION			
	Note: It is envisaged that the uPVC underlay or tarpaulin protection will be removed and re-used on all blocks that have roof repairs/replacement on this project. Hence, it is expected that the uPVC underlay or tarpaulin protection planning will follow the scheduled programme for the repairs/replacement of roofs and the Contractor to sequence the execution of same in a logical manner. The Contractor to price for the largest roof structure (377m2) and thereafter include a cost of the removal and re-use of the uPVC underlay or tarpaulin protection for the balance of the roof structures which equivalent to 1394m2 as a single line item.			
34	Allow for covering and maintaining existing roofs in watertight conditions during alterations by means of uPVC underlay or tarpaulins protection, properly secured and maintained in position for the approval of the Employer and make good all work damaged or disturbed after completion, approximately 377m2		Item	
	Carried Forward to Summary of Section No. 2			R

BUILDERS WORK (PROVISIONAL)
Bill No. 1
ALTERATIONS (PROVISIONAL)

Item No		Quantity	Rate	Amount
	SECTION NO. 2			
	BILL NO. 2			
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades			
	EARTHWORKS (PROVISIONAL)			
	(CPAP WORK GROUP NO. 104 UNLESS OTHERWISE STATED)			
	SUPPLEMENTARY PREAMBLES			
	Nature of ground			
	Use "assumed to be" if no trial holes, soils investigations, etc have been carried out - discuss with engineer. Use "Trial holes indicate that" where the ground has been investigated by means of trial holes			
	Nature of ground			
	A soils investigation has been carried out on site by the engineer and the report is annexed to these bills of quantities. Descriptions of excavations shall be deemed to include all ground conditions classifiable as "earth" described in the above report and where conditions of a more difficult character are indicated these are separately measured			
	Carting away of excavated material			
	Descriptions of carting away of excavated material shall be deemed to include loading excavated material onto trucks directly from the excavations or, alternatively, from stock piles situated on the building site			
	Carried Forward		R	

				R
	Brought Forward			
	Filling and layer work materials			
	References such as "G1", "G2", etc and "C1", "C2", etc in descriptions of filling and layer work materials refer to corresponding references in the document "Guidelines for Road Construction Materials. TRH 14 : 1985" compiled by the Committee of State Road Authorities and the properties set out therein for each kind shall be applicable to the respective materials described hereinafter			
	EXCAVATIONS, ETC.			
	Excavation in earth not exceeding 2m deep			
1	Trenches for ground beams (in confined spaces)	m3	65	
	Extra over all excavations for carting away			
2	Surplus material from excavations and/or stock piles on site, to a dumping site to be located by the contractor	m3	3	
	EXCAVATION, FILLING, ETC OTHER THAN BULK			
	FILLING, ETC.			
	Earth filling obtained from the excavations and/or prescribed stock piles on site, compacted to 93% Mod AASHTO density			
3	Backfilling to trenches and holes	m3	62	
	Earth filling supplied by the contractor			
4	G7 Material in accordance with SABS 1200 DM compacted to 102% Mod. AASHTO density.	m3	3	
	Compaction of surfaces			
5	Compaction of ground surface under floors etc including scarifying for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compacting to 98% Mod AASHTO density.	m2	32	
	Carried Forward			R

				R
	Brought Forward			
	Density tests			
6	"Modified AASHTO Density" test.	No	4	
7	"Field Density" test including "Optimum Moisture Content" (four readings per test).	No	4	
	SOIL POISONING			
	Soil insecticide in accordance with SANS 5859			
8	Under floors etc., including forming and poisoning shallow furrows against foundation walls etc., filling in furrows and ramming.	m2	32	
	Carried Forward to Summary of Section No. 2			R

BUILDERS WORK (PROVISIONAL)
Bill No. 2
EARTHWORKS (PROVISIONAL)

Item No			Quantity	Rate	Amount
	SECTION NO. 2				
	BILL NO. 3				
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades				
	CONCRETE, FORMWORK AND REINFORCEMENT (PROVISIONAL)				
	(CPAP WORK GROUP NO. 110 UNLESS OTHERWISE STATED)				
	SUPPLEMENTARY PREAMBLES				
	Cost of tests				
	The costs of making, storing and testing of concrete test cubes as required under clause 7 "Tests" of SABS 1200 G shall include the cost of providing cube moulds necessary for the purpose, for testing costs and for submitting reports on the tests to the architect. The testing shall be undertaken by an independent firm or institution nominated by the contractor to the approval of the architect. (Test cubes are measured separately)				
	Breeze concrete shall consist of twelve parts clean dry furnace ash, free from coal or other foreign matter, to one part cement (12:1), the ash graded up to particles which will pass a 16,5mm ring from a minimum which fails to pass a 4,75mm mesh. The finer materials from the screening are to be first mixed with the cement into a mortar and the ash added afterwards and thoroughly incorporated				
	REINFORCED CONCRETE CAST ON/IN FORMWORK				
	25MPa/19mm concrete				
1	Surface beds (in confined spaces)	m3	5		
	TEST BLOCKS				
2	Making and testing 150 x 150 x 150mm concrete strength test cube (Provisional).	No	3		
	Carried Forward			R	

	Brought Forward				R
	CONCRETE SUNDRIES				
	Finishing top surfaces of concrete smooth with a wood float				
3	Surface beds, slabs, etc.	m2	32		
	Structural epoxy adhesive				
4	Cutting back existing concrete surface bed at a 45 degree chamfer to expose 200mm reinforcement, including splicing of new reinforcement and applying "Prostruct 616" or equal and approved wet-to-dry concrete adhesive	m	32		
	MOVEMENT JOINTS, ETC.				
	10mm Isolation joints between vertical concrete and brick surfaces				
5	Not exceeding 300mm high.	m	32		
	DOWELS ETC				
	High tensile steel dowel bars				
6	10mm Diameter dowel bar 600mm long, at 600mm centres with one end drilled into existing 150mm thick concrete surface bed and applying "Prostruct 617" or equal and approved epoxy adhesive	No	54		
	REINFORCEMENT (PROVISIONAL)				
	(CPAP WORK GROUP NO. 114 UNLESS OTHERWISE STATED)				
	Fabric reinforcement				
7	Type 193 fabric reinforcement in concrete surface beds, etc.	m2	32		
	Carried Forward to Summary of Section No. 2				R
	BUILDERS WORK (PROVISIONAL) Bill No. 3 CONCRETE, FORMWORK AND REINFORCEMENT (PR				

Item No		Quantity	Rate	Amount
	SECTION 2			
	BILL NO. 4			
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades			
	MASONRY (PROVISIONAL)			
	(CPAP WORK GROUP NO. 116 UNLESS OTHERWISE STATED)			
	SUPPLEMENTARY PREAMBLES			
	The Tenderer is referred to the relevant Clauses in the separate document General Preambles for Trades (2017 Edition)			
	General			
	The quantities are provisional and will be re-measured upon completion of the works. The Contractor shall not use these quantities for ordering of materials. The Contractor must immediately notify the Quantity Surveyor if discrepancies are found between the quantities and/or descriptions in these Bills of Quantities and the Contractor's quantities measured from construction drawings and specifications.			
	Sizes in descriptions			
	Where sizes in descriptions are given in brick units, "one brick" shall represent the length and "half brick" the width of a brick			
	Face bricks			
	Bricks shall be ordered timeously to obtain uniformity in size and colour			
	Pointing			
	Descriptions of recessed pointing to fair face brickwork and face brickwork shall be deemed to include square recessed, hollow recessed, weathered pointing			
	Carried Forward		R	

				R
	Brought Forward			
	FOUNDATIONS			
	Brickwork of NFX bricks (14 MPa nominal compressive strength) in class III mortar			
1	Half brick wall lining, built on existing foundation, including shot-firing "Hilti" or other equal and approved drive pins into brickwork and one 10mm layer full height polystyrene joint filler between brick skins	m2	56	
	Brickwork reinforcement			
2	75mm Wide reinforcement built in horizontally	m	220	
	SUPERSTRUCTURE			
	Brickwork of "Corobrik" or equal and approved nominal compressive strength 7MPa Imperial NFP bricks in class III mortar			
3	Half-brick wall linings built against existing 110mm brickwall, including concertina wall ties, shot-firing "Hilti" or other equal and approved drive pins into brickwork and one 10mm layer full height polystyrene joint filler between brick skins	m2	49	
4	One brick walls	m2	8	
	BRICKWORK SUNDRIES			
	Brickwork reinforcement			
5	75mm Wide reinforcement built in horizontally	m	192	
6	150mm Wide reinforcement built in horizontally	m	31	
	Prestressed fabricated concrete lintels including necessary temporary supports			
7	110 x 75mm Lintels in lengths not exceeding 3m	m	10	
	Turning pieces to brick lintels			
8	230mm Wide turning piece to lintels, etc	m	5	
	Carried Forward			R

	Brought Forward			R
	Galvanised hoop iron cramps, ties, etc:			
9	30 x 1,6mm Roof tie 1,5m long with one end fixed to timber and other end cast into blockwork	No	12	
	FACE BRICKWORK			
	Corobrik® Titanium Satin FBX or equal and approved face brick pointed with recessed horizontal and vertical joints, to match existing			
10	Extra over brickwork for face brickwork	m2	8	
	Carried Forward to Summary of Section No. 2			R

BUILDERS WORK (PROVISIONAL)
Bill No. 4
MASONRY (PROVISIONAL)

Item No			Quantity	Rate	Amount
	SECTION NO. 2				
	BILL NO. 5				
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades				
	WATERPROOFING (PROVISIONAL)				
	(CPAP WORK GROUP NO. 120 UNLESS OTHERWISE STATED)				
	SUPPLEMENTARY PREAMBLES				
	General				
	The quantities are provisional and will be re-measured upon completion of the works. The Contractor shall not use these quantities for ordering of materials. The Contractor must immediately notify the Quantity Surveyor if discrepancies are found between the quantities and/or descriptions in these Bills of Quantities and the Contractor's quantities measured from construction drawings and specifications.				
	Waterproofing				
	Waterproofing of roofs, basements, etc. shall be laid under a ten year guarantee. Waterproofing to roofs shall be laid to even falls to outlets, etc. with necessary ridges, hips and valleys. Descriptions of sheet or membrane waterproofing shall be deemed to include additional labour to turn-ups and turn-downs				
	DAMP-PROOFING OF WALLS AND FLOORS				
	Two coats "ABE Brixeal" or equal and approved bitumen emulsion waterproof coating				
1	On brick walls	m2	8		
	Carried Forward			R	

	Brought Forward			R
	WATERPROOFING TO ROOFS, BASEMENTS, ETC			
	One layer "Derbigum " SP4 or equal and approved torch-fusion membrane by specialists laid with 75mm side and 100mm end laps			
2	On flat roofs.	m2	20	
3	On turn-ups and turn-downs not exceeding 300mm girth	m2	6	
	Five coats "Acrylastic" or equal and approved fibre reinforced heavy duty maintenance free acrylic waterproofing			
4	Collar around pipe not exceeding 100mm internal diameter.	No	1	
	PROTECTIVE ROOFING PAINT			
	Two coats bituminous aluminium paint			
5	On waterproofing to flat roofs.	m2	20	
6	On turn-ups and turn-downs not exceeding 300mm girth	m2	6	
	JOINT SEALANTS, ETC.			
	"Dow corning" or equal and approved two-part grey polysulphide sealing compound including backing cord, bond breaker, primer, etc.			
7	10mm In isolation joints in floors.	m	32	
	Carried Forward to Summary of Section No. 2			R

BUILDERS WORK (PROVISIONAL)
Bill No. 5
WATERPROOFING (PROVISIONAL)

Item No		Quantity	Rate	Amount
	SECTION 2			
	BILL NO. 6			
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades			
	ROOF COVERINGS (PROVISIONAL)			
	(CPAP WORK GROUP NO. 125 UNLESS OTHERWISE STATED)			
	SUPPLEMENTARY PREAMBLES			
	The Tenderer is referred to the relevant Clauses in the separate document General Preambles for Trades (2017 Edition)			
	The Contractor is to confirm the sizes for flashings and accessories and to ensure that their rates are for flashings and accessories that are in accordance with the manufacturer's requirements.			
	The quantities are provisional and will be re-measured upon completion of the works. The Contractor shall not use these quantities for ordering of materials. The Contractor must immediately notify the Quantity Surveyor if discrepancies are found between the quantities and/or descriptions in these Bills of Quantities and the Contractor's quantities measured from construction drawings and specifications.			
	All flashing finish to match sheeting finish or profile of sheeting where applicable			
	Carried Forward		R	

	Brought Forward			R
	Profiled metal sheeting and accessories			
	PROFILED METAL SHEETING AND ACCESSORIES			
	0.58mm Thick "Klip-tite 700" or equal and approved double-interlocking concealed fixed profile IBR sheeting, cut from certified Z275 galvanised steel, fixed to timber purlins (elsewhere measured) using KL700 clips, finished with Chromadek Ultrim colour coated finish to one side and pebble grey backing coat to other with galvanised waferhead screws, all to manufacturers instructions.			
	Note: The bidder is to include for the provision of a certificate of compliance for the roof sheeting within the rate, as provided by the manufacturer.			
1	Roof covering with pitch not exceeding 25 degrees.	m2	1,771	
2	Standard galvanised ridge capping (550mm girth) screwed through sheeting to purlins	m	146	
3	Sondor IBR pattern polyclosures to underside of ridge capping	m	292	
	PROFILED METAL SHEETING AND ACCESSORIES			
4	150 x 150mm side wall flashing, to match roof sheeting	m	84	
5	Counter flashing, to match roof sheeting	m	47	
6	Headwall flashing including S10 brackets pop-riveted to flashing and roofing	m	18	
	ROOF AND WALL INSULATION			
	"Alucool A1" Or equal and approved non-combustible Aluminium Foil based insulation			
7	135mm Glass mineral insulation laid taut over purlins and fixed concurrent with roof covering including galvanised steel straining wires and 48mm DS tape, installed as per manufacturers guidelines.	m2	1,771	
	Carried Forward to Summary of Section No. 2			R

BUILDERS WORK (PROVISIONAL)
Bill No. 6
ROOF COVERINGS (PROVISIONAL)

Item No		Quantity	Rate	Amount
	SECTION 2			
	BILL NO. 7			
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades			
	CARPENTRY AND JOINERY (PROVISIONAL)			
	(CPAP WORK GROUP NO. 126 UNLESS OTHERWISE STATED)			
	SUPPLEMENTARY PREAMBLES			
	Joinery			
	Descriptions of frames shall be deemed to include frames, transomes, mullions, rails, etc			
	Descriptions of hardwood joinery shall be deemed to include pelleting of bolt holes			
	Fixing			
	Items described as "nailed" shall be deemed to be fixed with hardened steel nails or shot pins to brickwork or concrete			
	Decorative laminate finish			
	Laminate finish shall be glued under pressure. Edge strips shall be butt jointed at junctions with adjacent similar finish			
	Carried Forward		R	

	Brought Forward			R
	ROOFS ETC			
	PREFABRICATED TIMBER ROOF TRUSSES, ETC			
	NOTE:			
	Timber roof trusses are to comply with SABS Code of Practice 0243. (The design, manufacture and erection of timber trusses, including nail-plated and bolted trusses with lapped members).			
	The following is applicable in respect of roof trusses:			
	Trusses are at maximum 1200mm centres. Roof covering is IBR profiled metal sheeting colour one side on 50 x 76mm purlins. Ceilings are nailed gypsum plasterboard on brandering.			
	The dimensions in the descriptions of the trusses are nominal and actual measurements are to be obtained from site before design or fabrication commences.			
	Plate nailed timber roof truss construction			
1	Design, supply and install roof truss system complete in accordance with the Standard Building Regulations, including cross battens at hips, valleys, etc. fixed to trusses with and including ring shank nails, hurricane clips at exposed sections and at ridges, temporary and permanent bracing, etc. to suit roof area approximate size **45m2 (on flat floor area inclusive of overhangs) Block 7**		Item	
2	Allowance for the issue of TR1 and TR2 certificates after completion of entire roof installation, signed by a competent person		Item	
	Wrought softwood			
3	38 x 114mm Bolted Wall Plates	m	383	
4	76 x 50mm Purlins	m	2,058	
5	114 x 50mm Timber beam bolted to steel post, including all necessary connection plates at beam splices and junctions with walls	m	246	
	Carried Forward			R

	Brought Forward			R
6	38 x 114mm Timber backing board fixed onto rafter for facsia boards	m	572	
	EAVES, VERGES, ETC			
	Nutec-cement or equal and other approved			
7	225 x 10mm Fascia boards including galvanised steel H-profile jointing strips	m	383	
8	200 x 80mm Barge boards including galvanised steel H-profile jointing strips	m	189	
	Carried Forward to Summary of Section No. 2			R

BUILDERS WORK (PROVISIONAL)
Bill No. 7
CARPENTRY AND JOINERY (PROVISIONAL)

Item No		Quantity	Rate	Amount
	SECTION NO. 2			
	BILL NO. 8			
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades			
	CEILINGS, PARTITIONS AND ACCESS FLOORING (PROVISIONAL)			
	(CPAP WORK GROUP NO. 129 UNLESS OTHERWISE STATED)			
	SUPPLEMENTARY PREAMBLES			
	Fixing			
	Items described as "nailed" shall be deemed to be fixed with hardened steel nails or pins or 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 600mm centres, and where described as "bolted" the bolts have been given elsewhere			
	Ceilings			
	Unless otherwise described ceilings shall be deemed to be horizontal			
	Bulkheads			
	Bulkheads are defined as those portions of ceilings which has stepped down from the general ceiling level in a particular room or area and which generally occur along the perimeter. Their purpose is either to conceal services or to create architectural features.			
	Bulkheads have only been described as such where they conform to the above definition and where the horizontal or vertical dimensions do not exceed 900mm. Where these dimensions are more than 900mm such portions of ceilings have been included in the appropriate general items of ceilings.			
	Carried Forward		R	

	Brought Forward			R
	Unless otherwise described bulkheads shall be deemed to be horizontal along the length.			
	Steel components			
	All steel components for ceilings, partitions, etc. are to be galvanised in accordance with SANS 121.			
	NAILED-UP CEILINGS			
	9mm 'Gpyroc' or equal and approved plasterboard ceiling fixed by means of drywall screws at 150mm centres to 38 x 50mm brandering with joints covered with 50mm wide self adhesive glass fibre tape and finished with jointing tape and skimmed with one coat Rhinolite, sanded level to receive new paint, all in strict accordance with the manufacturer's instructions (Paintwork measured elsewhere)			
1	Ceilings including 38 x 50mm sawn softwood brandering at 500mm centres in one direction to existing trusses.	m2	498	
2	Extra over ceiling for 600 x 600mm trap door including rebated framing cross branders covered with ceiling board and fitted flush opening	No	15	
	SUSPENDED CEILINGS			
	Note:			
	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 insetting out that may be required (ceiling panels have not been deducted and pricing is to take cognisance thereof)			
	12mm Moisture resistant plasterboard ceiling fixed to a manufacturer approved suspended ceiling grid system with tapered edges facing down using 32mm drywall at 150mm centres with all joints sealed with a 50mm jumbo tape and a 5mm jumbo skimming layer to entire ceiling to receive paint (Paintwork measured elsewhere)			
3	Moisture resistant ceilings not exceeding 1m below existing timber purlins	m2	62	
	Carried Forward			R

	Brought Forward			R
	CORNICES, TRIMS, ETC.			
	Donn SM25 or equal and approved shadow line			
4	Shadow line, trim plugged	m	88	
	Gypsum Plasterboard Cornice			
5	75mm Coved cornice.	m	513	
	Carried Forward to Summary of Section No. 2			R

BUILDERS WORK (PROVISIONAL)
Bill No. 8
CEILINGS AND PARTITIONS (PROVISIONAL)

Item No			Quantity	Rate	Amount
	SECTION NO.2				
	BILL NO. 9				
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades				
	FLOOR COVERINGS, WALL LININGS, ETC. (PROVISIONAL)				
	(CPAP WORK GROUP NO. 130 UNLESS OTHERWISE STATED)				
	SUPPLEMENTARY PREAMBLES				
	General				
	The relevant SABS standards of work must be applied to all aspects and components of the works				
	Fixing				
	Floor coverings, wall linings shall, where applicable, be fixed with adhesive as recommended by the manufacturers of the flooring, linings				
	FLOOR COVERINGS				
	Carpets				
	Allow for a PC sum of R150.00/m2 for 4.5mm thick carpet tiles, including adhesive and installed in accordance with manufacturer's instructions				
1	On floors and landings	m2	41		
	Carried Forward			R	

	Brought Forward			R
	POLISH, SEALERS, ETC.			
	Strip and seal with three coats approved Matt or Gloss sealer in accordance with the manufacturer's specifications			
2	Vinyl floor sheeting, etc	m2	41	
	SUNDRIES			
	'Kirk' or similar approved aluminium dividing strips			
3	3mm Aluminium straight edge transition strip	m	6	
	Carried Forward to Summary of Section No. 2			R

BUILDERS WORK (PROVISIONAL)
Bill No. 9
FLOOR COVERINGS, WALL LININGS, ETC. (PROVISIO

Item No		Quantity	Rate	Amount
	SECTION 2			
	BILL NO. 10			
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades			
	STRUCTURAL STEELWORK (PROVISIONAL)			
	(CPAP WORK GROUP NO. 134 UNLESS OTHERWISE STATED)			
	The Tenderer is referred to the relevant Clauses in the separate document Model Preambles for Trades (2008 Edition).			
	SUPPLEMENTARY PREAMBLES			
	General			
	All steelwork is to be in accordance with SANS 1200H, 10120 and 10162. Material is to be Grade 300WA			
	All shop drawings are to be approved by the Engineer prior to fabrication			
	Connections and welds are to be full strength			
	All dimensions and levels are to be checked on site prior to fabrication			
	Adequate temporary bracing is to be provided during erection of structural steelwork			
	No site cutting, drilling or welding will be permitted without the prior consent of the Engineer			
	Carried Forward		R	

	Brought Forward			R	
	Structural steelwork shall be to the following: Hot rolled sections: SANS 1431 grade 350W Hot rolled structural tubing: SANS 1431 grade 350 W Hot rolled plate: SANS 1431 grade 300 W Cold rolled sections shall have a minimum yield of 225Mpa All hot rolled connections to be dia. 20 bolts grade 8.8 All cold rolled sections to be dia. 16 bolts grade 4.8 All bolts to be hot dipped galvanised Cold rolled sections to be hot dipped galvanised				
	Descriptions Descriptions of structural steelwork shall be deemed to include preparation of shop detail drawings, fabrication and erection, including all welding, holes, blacks bolts, nuts, washers, rivets, packings, etc. Descriptions of holding down bolts shall be deemed to include bending, threading, nuts and washers and embedding in concrete Descriptions of bolts shall be deemed to include nuts and washers Descriptions of expansion anchors and bolts and chemical anchors and bolts shall be deemed to include nuts, washers and mortices in brickwork or concrete				
	UNGALVANISED STEELWORK **STEEL COLUMNS AND BEAMS** **Welded columns in single lengths with flat base, cap, bearer and connection plates, bolted to concrete**				
1	Ungalvanised structural steelwork, comprising of posts, rafters, beams, purlins, base plates, connection plates, bolts, etc.	t			**RATE ONLY**
	Carried Forward			R	

	Brought Forward			R
	PAINTING; ETC.			
	External Paintwork			
	Remove all paint, oil and grease and apply one coat self etching primer, one coat alkyd based universal undercoat and two coats superior quality universal water based enamel paint, on ungalvanised steel			
2	On structural steel beams, rafters, bracing, cleats, plates, etc.	m2	191	
	BUDGETARY ALLOWANCES			
3	Allow a sum of R 40,000.00 (Forty Thousand Rand) for minor remedial work to existing structural steel			SUM
	Carried Forward to Summary of Section No. 2			R

BUILDERS WORK (PROVISIONAL)
Bill No. 10
STRUCTURAL STEELWORK (PROVISIONAL)

Item No			Quantity	Rate	Amount
	SECTION NO. 3				
	BILL NO. 11				
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades				
	PLASTERING (PROVISIONAL)				
	(CPAP WORK GROUP NO. 142 UNLESS OTHERWISE STATED)				
	SCREEDS				
	Screeds steel trowelled, on concrete				
1	Average 50mm thick on floors to falls	m2	41		
	Screeds laid to falls				
2	Average 35mm thick to falls on concrete flat roofs	m2	20		
	INTERNAL PLASTER				
	Cement plaster steel trowelled, on brickwork				
3	On half brick wall linings	m2	49		
4	On narrow widths	m2	4		
	Carried Forward to Summary of Section No. 2			R	

Item No			Quantity	Rate	Amount
	SECTION 2				
	BILL NO. 12				
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades				
	PLUMBING AND DRAINAGE (PROVISIONAL)				
	(CPAP WORK GROUP NO. 148 UNLESS OTHERWISE STATED)				
	RAINWATER DISPOSAL				
	Pre-coated seamless aluminium gutters including matching rivet fixed mitres and end caps sealed using silicon mastic hung by screws fixed to internal aluminium hangers and at 500mm centres with accessories installed in accordance with manufacturers instructions, colour to Architects approval (non-standard colours)				
1	150mm x 125mm 0.6mm Seamless aluminium profiled gutters fixed to underside of the roof	m	343		
2	100 x 75mm Fluted aluminium rainwater downpipes with baked enamel finish	m	253		
3	Extra over gutter for stopped end	No	54		
4	Extra over eaves gutter for drop box suitable 150 x 125mm box gutter	No	47		
5	Extra over 75mm rainwater pipe for shoe	No	51		
6	Extra over rainwater pipe for bend	No	106		
	Carried Forward to Summary of Section No. 2			R	
	BUILDERS WORK (PROVISIONAL) Bill No. 12 PLUMBING AND DRAINAGE (PROVISIONAL)				

Item No			Quantity	Rate	Amount
	SECTION NO. 3				
	BILL NO. 13				
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades				
	GLAZING				
	(CPAP WORK GROUP NO. 150 UNLESS OTHERWISE STATED)				
	GLAZING TO WOOD/STEEL WITH PUTTY				
	6mm Thick obscure safety glass				
1	Panes exceeding 0,1m2 and not exceeding 0.5m2	m2	5		
	Carried Forward to Summary of Section No. 2			R	

Item No			Quantity	Rate	Amount
	SECTION 2				
	BILL NO. 14				
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades				
	PAINTWORK (PROVISIONAL)				
	(CPAP WORK GROUP NO. 152 UNLESS OTHERWISE STATED)				
	PAINTWORK ETC TO NEW WORK				
	ON INTERNAL FLOATED PLASTER				
	Prepare and brush surface to remove all loose contaminants and apply one coat PP700 gypsum and plaster primer and two coats "Plascon Polvin" or equal approved emulsion paint for interior use				
1	On half brick wall linnings	m2	53		
2	Walls in beamfilling	m2	115		
3	Walls in patches	m2	10		
	ON EXTERNAL FLOATED PLASTER				
	Prepare and brush surface to remove all loose contaminants and apply one coat alkali resistant primer, and two coats "Plascon Wall 'n All" or equal approved emulsion paint for external use				
4	Walls in beamfilling	m2	115		
5	Walls in patches	m2	10		
	Carried Forward			R	

	Brought Forward			R
	ON PLASTER BOARD			
	Prepare and brush surface to remove all loose contaminants and apply one coat "Plascon" primer, one coat "Plascon" under coat and two coats "Plascon Velvaglo", all in accordance with the Manufacturers specification			
6	On ceilings and cornices	m2	498	
	Prepare and brush surface to remove all loose contaminants and apply one coat professional gypsum and plaster primer on a clean, dry, defect free surface and allow to dry for a minimum of 16 hours and apply two coats of "Plascon" hygiene low sheen paint, including drying time of 2 hours between coats			
7	On skimmed ceilings	m2	55	
	ON FIBRE-CEMENT SURFACES			
	One coat alkali resistant primer and two coats superior quality acrylic emulsion paint for interior use			
8	On exterior fascias and barge boards	m2	172	
	ON WOOD			
	Prepare and brush surface to remove all loose contaminants and apply two coats "A.B.E Provonite" or equal approved anti-corrosive coal tar paint			
9	On roof timbers at eaves and verges	m2	406	
	Carried Forward to Summary of Section No. 2			R

BUILDERS WORK (PROVISIONAL)
Bill No. 14
PAINTWORK (PROVISIONAL)

Item No		Quantity	Rate	Amount
	SECTION 2			
	BILL NO. 15			
	BUDGETARY ALLOWANCES (PROVISIONAL)			
	EXPOSING/INVESTIGATION OF EXISTING FOUNDATIONS			
1	Allow a sum of R 25,000 (Twenty Five Thousand Rand) for the exposing of foundations, including all necessary breaking up of concrete, excavation, stockpiling, carting away, testing, etc.	Item		
2	Profit	Item		
3	Attendance	Item		
	Carried Forward to Summary of Section No. 2		R	

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Carried to Final Summary R

BUILDERS WORK (PROVISIONAL)

Item No			Quantity	Rate	Amount
	SECTION NO. 3				
	BILL NO. 1				
	CONCRETE APRONS (ALL TRADES) (PROVISIONAL)				
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades				
	EARTHWORKS (PROVISIONAL)				
	(CPAP WORK GROUP NO. 104 UNLESS OTHERWISE STATED)				
	EXCAVATION OTHER THAN BULK				
	Excavation in earth not exceeding 2m deep				
1	Reduced levels under floors	m3	9		
	CARTING AWAY				
	Extra over all excavations for loading, carting and dumping surplus excavated material				
2	Off site to be located by the contractor	m3	10		
	COMPACTION				
	Compaction of surfaces				
3	Compaction of ground surfaces under floors etc including scarifying for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compacting to 95% Mod. AASHTO density	m2	71		
	TESTS				
	Prescribed density tests on filling				
4	Modified AASHTO Density test	No	8		
	Carried Forward			R	

				R
	Brought Forward			
5	"Field Density" test including "Optimum Moisture Content" (four readings per test)	No	8	
	SOIL POISONING			
	Soil insecticide in accordance to SANS 5859			
6	Under floors, etc. including forming and poisoning shallow furrows against foundation walls, etc., filling in furrows and ramming	m2	71	
	CONCRETE, FORMWORK AND REINFORCEMENT			
	(CPAP WORK GROUP NO. 110 UNLESS OTHERWISE STATED)			
	REINFORCED CONCRETE CAST ON/IN FORMWORK			
	20MPa/19mm Concrete			
7	Surface beds, slabs, etc to falls and currents	m3	9	
	CONCRETE SUNDRIES			
	Finishing top surfaces of concrete with a wood float finish			
8	Concrete channel to falls	m2	71	
	Test blocks			
9	Prepare a set of six concrete cubes each cube size 150 x 150 x 150mm for strength cubes and deliver to an approved laboratory for testing and pay all charges in connection therewith	Sets	9	
	ROUGH FORMWORK (DEGREE OF ACCURACY II)			
	(CPAP WORK GROUP NO. 111)			
	Rough formwork to sides			
10	V drains, paving and ramps not exceeding 300mm high	m	73	
	Carried Forward			R

	Brought Forward			R
	MOVEMENT JOINTS, ETC.			
	Expansion joints with 10mm softboard between vertical concrete and brick surfaces			
11	10mm Joints not exceeding 300mm high	m	93	
	REINFORCEMENT (PROVISIONAL)			
	(CPAP WORK GROUP NO. 114)			
	Fabric reinforcement			
12	Type 193 fabric reinforcement in concrete surface beds, slabs, etc	m2	71	
	WATERPROOFING			
	(CPAP WORK GROUP NO. 120 UNLESS OTHERWISE STATED)			
	JOINT SEALANTS, ETC			
	"ABE Flexothane" or equal and approved two-part grey polysulphide sealing compound including backing cord, bond breaker, primer, etc			
13	In 10mm joints not exceeding 300mm high	m	93	
	Carried to Final Summary			R

EXTERNAL WORKS
Bill No. 1
CONCRETE V-DRAINS (PROVISIONAL)

Item No		Quantity	Rate	Amount
	SECTION 4			
	BILL NO. 1			
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades			
	ELECTRICAL INSTALLATION (PROVISIONAL)			
	(CPAP WORK GROUP NO. 160 UNLESS OTHERWISE STATED)			
	Tenderers are to note that the sum included in the amount column of this section of the Bill of Quantities, should be the total of all priced items in the Electrical Installation, Bill of Quantities as attached hereafter.			
1	Electrical Installation (transferred from page 108 of Electrical Installation BOQ attached hereafter)		SUM	
2	Electronic Installation (transferred from page 118 of Electronic Installation BOQ attached hereafter)		SUM	
	Carried to Final Summary		R	
	ELECTRICAL INSTALLATION (PROVISIONAL) Bill No. 1 ELECTRICAL INSTALLATION (PROVISIONAL)			

SPECIFICATION FOR THE ELECTRICAL INSTALLATION
ST ANDREWS HOASPITAL - ASBESTOS ERADICATION AND ROOF WORKS

SECTION TWO

BILLS OF QUANTITIES

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BILL OF QUANTITIES

GENERAL NOTES

1. This Bill of Quantities forms part of, and must be read in conjunction with the complete specification and must be submitted, duly completed, on the closing date of tenders.

2. Tenderers must complete the Bill of Quantities and detail the unit rate and total amount of each item.

   The "Total" shall constitute the tender price for adjudication.

   Tenderers are advised to check their item extension and total additions as arithmetical errors occurring in the priced Bill of Quantities cannot be considered as having an effect on the tender amount.

3. No alteration, erasure or addition is to be made in the text of the Bill of Quantities. Should any alteration, erasure or addition be made it will not be recognised but the original wording of the Bill of Quantities will be adhered to.

   The Engineer will check the completed Bill of Quantities and reserves the right to adjust any individual price and to rectify any discrepancy whilst the total tender price as quoted remains unaltered.

4. The quantities given in the Bill for cable, cable markers, earth wire laid with cable, overhead conductors, overhead earth wire and excavations cannot be regarded as exact and are subject to measurement on site after completion of the service and adjustments will be made according to the unit rates given in the Bill.

   All other quantities will not be measured on site.

   In the event of discrepancies between the drawings, specifications and Bill of Quantities the Engineer shall decide whether the work as executed shall be remeasured on site or whether remeasurement shall be effected from the working drawings only.

5. The Bill of Quantities is to be used for pricing and financial purposes only. The drawings take precedence over the particular (project) specification but should be used in conjunction with these specifications. The Project Specification takes precedence over quality specifications and the Bill of Quantities.

   NOTE:

   Checking of Cable and Overhead Conductor Lengths. Notwithstanding the fact that lengths of cables and overhead conductors, as given in the Bill of Quantities, have been measured from scaled drawings, the Contractor shall check such lengths on site before ordering the cable as he will not be paid for excess cable after the completion of the service. Any allowance for off-cuts shall be made in the unit rates. The final measurements shall be based on the nett route length of the cables and overhead lines concerned. installed in accordance with the specification. However, the onus is on the Contractor to prove compliance with the specification.

6. The unit prices quoted in the Bill of Quantities shall include for such small materials as are required for the complete installation in accordance with the specification.

7. Bill No. 1 is to be regarded as fixed and will not be adjusted for variations in the final contract value or contract period.

   NOTE:

   Tenderers may not include the costs of the items of Bill No.1 in the unit rates for items in the remainder of the Bill of Quantities. Bill No.1 is to be completed as indicated.

   Failure to comply will result in the Engineer arbitrarily adjusting rates to exclude Preliminary and General Costs.

8. Unit prices for the same items in different Bills shall in all cases be the same, and in the case of differences, the Engineer

reserves the right to change such unit prices when the completed list is checked, without adjusting the tender price.

9. The total for each page of each Bill is to be carried forward to the collection page at the end of each Bill.

10. P.C., Provisional and Contingency allowances, items and sums shall be expended as directed by the Engineer, and any balance remaining shall be deducted from the amount of the contract sum. Tenderers may not regard any unspent moneys as forming part of the final contract value.

    Variation Instruction No.1 will be issued after award of the contract to omit all P.C., Provisional and Contingency sums/allowances from the contract and authorized contract value.

11. Variation work, as well as the items described above, shall be measured as executed, and paid for according to unit prices in the Bill of Quantities. Where unit prices are not available, the work shall be priced, in conjunction with the Engineer, at current rates.

12. Unless otherwise specified in the Bill of Quantities, all items are to be priced on the basis of supply, delivery, offload, installation, connection, testing and commissioning.

    All prices are to be EXCLUSIVE OF V.A.T but inclusive of import duties, surcharges, commissions to third parties, etc., where applicable. The foregoing items, as well as the Contractor's handling, financing and profit mark-up, is not to be separately detailed, and must be included in the cost rates.

13. Unless otherwise stated, all measurements are net, in accordance with the drawings, and no allowance has been made for wastage.

14. The Employer reserves the right to increase or decrease the extent of the contract works, in accordance with the contract conditions, by issuing written variation instructions to omit or add, as may be requirec the supply and/or installation of any item of equipment or work, whether listed in the Bill of Quantities or not, and without affecting the unit cost rates indicated in the Bill of Quantities or Preliminary and General items.

15. In the event that Tenderers disagree with the measured quantities the tender should be qualified accordingly, listing the items and quantities in question.

16. The unit prices quoted in the Bill of Quantities must include for small installation materials such as nuts, bolts, nails, saddles, screws etc. as are required for the satisfactory complete installation in accordance with the specification.

17. Unless otherwise stated in the Bill, the unit cost rates shall be based on the following:

    The rate for conduit boxes and for outlet boxes up to and including 100 x 100 mm shall be the same regardless of the number of entries.

    The rate for conduit and outlet boxes shall include for fixing to the conduit with lock and bushnuts as may be required and for fixing to the building structure.

    The rate for outlet boxes shall be without covers and draw boxes shall be complete with covers and screws.

    The rate for industrial switch and plug units shall include for the relevant enclosure and fixing to conduit and building structure.

    The rate for light switches, switch plugs, dimmer units, etc., shall include for screws, cover plates and fuses/breakers where applicable and for connection of wiring thereto.

    The rate for conduit up to and including 25 mm diameter shall include all couplings, bends, boxes etc. as may be required.

    The rate for luminaires and accessories shall include for connection of the wiring thereto.

18. All measurements are based on the most economical route lengths without any allowance for wastage, jointing or slack.

19. In the case of wiring in conduit, an allowance of 300 mm per wire outlet box position has been made and in the case of cables and wiring entering switchboards, an allowance of 1000 and 2000 mm has been made for termination purposes in sub-distribution and main distribution boards respectively.

20. It should be noted that, notwithstanding anything to the contrary, any items completed or listed in the Bill of Quantities by the Tenderer will not be taken into account, will not be subject to re-measurement, and will not be regarded as a Bill of Quantities item.

21. Where equipment is specified by name, the tenderer must price on this basis. Alternatives may be offered by tenderers but the use of which is subject to written approval by the Engineer.

	BILL No. 1 PRELIMINARY AND GENERAL	QTY	UNIT	RATE	TOTAL
	The costs for the following items shall not be included in thecost rates for work listed in the rest of the Bill of Quantities.				
a)	Cost for compliance with Main Contractor's preliminary and general items not covered below.	Item			
b)	Contractual requirements as specified, i.e guarantees, insurance, sureties, company's overheads administration etc.	Item			
c)	Contract engineer, administration, supervision, programming and manager	Item			
d)	Establish site accommodation, storage etc.	Item			
e)	Maintain and operate site establishment.	Item			
f)	Remove site establishment on completion and remove all rubbish, foundations, concrete bases, dirt oil spillage, etc, and leave site in condition as found.	Item			
g)	Tools, equipment, plant hire and testing gear/meters as necessary.	Item			
h)	Maintenance and guarantee of the complete installation including fitting, material and workmanship for a period of twelve months from date of completion and handover	Item			
i)	Certificate of compliance to be issued on completion of the project in addition to detailed testing as specified	Item			
j)	3 Sets of as-built drawings and manuals	Item			
k)	Other items not included in the foregoing and required by the Contractor are to be listed and priced below.	Item			
	TOTAL FOR BILL No. 1 CARRIED TO SUMMARY			R	0.00

	BILL No. 2 GENERAL ITEMS	QTY	UNIT	RATE	TOTAL
	GENERAL				
a)	Provide one sample lug cut through at 45 deg. for each of the PVC SWA PVC ECC cables exceeding 25 mm² as per the cable schedule including supply of lug	Item			
b)	Liase with Telecommunications provider for the approval of conduits, cable trays, sleeves, power skirting and JBs installed	Item			
c)	Earth cable trays and ladders with 10 mm² Cu PVC cable jumpers across joints, splices, elbows, tees etc.	Item			
d)	Liason with various sub-contractors in regard to final building dimension, access routes, limiting sizes, constraint of equipment etc.	Item			
e)	Supervise / Liaise with builder during construction of cores, recesses and penetrations in concrete and brickwork to ensure they are formed in the correct positions	Item			
f)	Liase with relevant sub-contractors in regard to cable entry requirements, phase rotation and control wiring connection facilities required and to be provided in each sub-contractors switchboard for use by the electrical contractor in connecting up	Item			
	TESTING AND COMMISSIONING				
g)	Testing equipment to carry out site tests as specified for lux levels, cables, distribution boards etc.	Item			
h)	Compile all typed test reports, commissioning data, marked up "as built" drawings, package in plastic covered A4 files and plastic envelopes correctly indexed, and submit to the Engineer for review.	Item			
i)	Update as built drawings and test results as necessary, and suppliers' information indexed correctly	Item			
j)	Complete an IBUYA test sheet per DB including earth loop impedance tests on all cables prior to terminating ends and earth loop impedance testing of each circuit as specified	Item			
	TOTAL FOR BILL No. 2 CARRIED TO SUMMARY			R	0.00

	BILL No. 3 CABLE LADDERS	QTY	UNIT	RATE	TOTAL
	The complete supply, transport to site, store in accordance with the specification of hot dip galvanised heavy duty cable basket with 75 mm high side rail. Rates to include for bends, T's, risers and offsets as required				
a)	300 mm wide	10	m		
	Extra on last to install horizintally (trapeeze) or vertically (P1000 unistrut). Fixings at 1000mm. Installation is to include for all joiner splices, raw bolts and fixing cable trays to unistrut with bolt fasteners complete with spring washer, fixing bolts etc.				
b)	300 mm wide	10	m		
c)	Earthing and bonding of cable basket and galvanised trunking	Item			
	TOTAL FOR BILL No. 3 CARRIED TO SUMMARY			R	0.00

	BILL NO 4 - CABLING	QTY	UNIT	RATE	TOTAL
	The complete supply, test and commission in accordance with the specification 1000/600V Cu PVC SWA PVC ECC cables as specified.				
a)	16 mm² 4 core	20	m		
b)	16 mm² 2 core	20	m		
	Extra on last to install fixed to cable ladder with K Clamp every 500 mm vertical, and 2000mm horizontally. Additional piece of PVC insulation is to be installed between clamp and cable;				
c)	16 mm² 4 core	20	m		
d)	16 mm² 2 core	20	m		
	Extra on last to terminate cable with a Pratley/ CCG gland complete with long shroud and brass earth tag;				
e)	16 mm² 4 core	6	No.		
f)	16 mm² 2 core	6	No.		
g)	Provisional sum for additional cabling as required	Item			
h)	Profit and Attendance on above		%		
	TOTAL FOR BILL No. 4 CARRIED TO SUMMARY			R	0.00

	BILL No. 5 DISTRIBUTION BOARDS	QTY	UNIT	RATE	TOTAL
	Supply, transport to site and store in accordance with the specification of distribution boards complete as specified.				
a)	Work Shops DBs as per drawing 400-404	5	No.		
b)	Audiometry DB A as per drawing 405	1	No.		
c)	Crisis Centre DB C as per drawing 406	1	No.		
d)	Doctors House DB D as per drawing 407	1	No.		
e)	Laundry DB L1/L2 as per drawing 408-409	2	No.		
f)	Mortuary DB M as per drawing 410	1	No.		
g)	Occupational Therapy DB OT as per drawing 411	1	No.		
h)	Tuck Shop/Server Room DB T as per drawing 412	1	No.		
i)	Provisional sum for additional distribution board as required	Item			
j)	Profit and Attendance on above		%		
	TOTAL FOR BILL No. 5 CARRIED TO SUMMARY			R	0.00

	BILL NO 6 - LUMINAIRES	QTY	UNIT	RATE	TOTAL
	The complete supply, transport to site and store in accordance with the specification of luminiares as scheduled, complete with lamps				
a)	Type A	200	No.		
b)	Type B	40	No.		
c)	Type C	6	No.		
	Install and connect luminaires as scheduled				
d)	Type A	45	No.		
e)	Type B	8	No.		
f)	Type C	4	No.		
g)	Provisional sum for additional lighting as required	Item			
h)	Profit and Attendance on above		%		
	TOTAL FOR BILL No. 6 CARRIED TO SUMMARY			R	0.00

	BILL No. 7 - WORKSHOPS SMALL POWER AND LIGHTING	QTY	UNIT	RATE	TOTAL
	SMALL POWER				
	Supply and install PVC conduit cast into slab, including all fixings				
a)	25mm	15	m		
	Supply and install galvanised conduit boxes - Recessed.				
b)	100 x 100/50 box, complete with cover	4	No		
c)	Round conduit box, complete with cover	40	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
d)	P9000	35	m		
	Supply and install 2 compartment power skirting complete with PVC covers, splices, corners, endcaps etc.				
e)	Cabstrut powder coated galvanized steel power skirting or equal and approved	10	m		
	(Cabstrut or approved equal) flush, including cradles and covers.				
f)	16 A 3 pin single switched socket outlet. Complete with white cover and toggle switch	5	No.		
g)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	2	No.		
h)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
i)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
j)	Data socket	1	No.		
	Supply, install and connect electrical accessories (Cabstrut or approved equal) including covers and boxes. Toggle White, Red or Blue				
k)	16 A 3 pin single switched socket outlet including 2 prong + earth socket (flush) Complete with with toggle and white cover.	5	No.		
l)	Double 16 A 3 pin single switched socket outlet (flush) complete with white cover and toggle	1	No.		
m)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
	CARRIED TO COLLECTION PAGE			R	0.00

	BILL No. 7 - WORKSHOPS SMALL POWER AND LIGHTING	QTY	UNIT	RATE	TOTAL
a)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
b)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes. Toggle White, Red or Blue				
c)	20 A SP isolator in conduit box (surface or flush)	1	No.		
d)	30 A TP industrial isolator in conduit box (surface)	1	No.		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
e)	4 mm² 2 core	115	m		
	Extra on last for glands, terminations and connection				
f)	4 mm² 2 core	10	No		
	Supply and install PVC insulated 1 000 V grade hard drawn copper wire in trunking or drawn into conduit and coloured as required:-				
g)	1.5 mm² left in conduit/trunking as draw wire	50	m		
h)	2.5 mm²	50	m		
i)	4 mm²	150	m		
	Supply and install partition / cluster boxes - surface, chased into brickwork (patching by others) or cast in. (Crabtree or approved equal) including universal cradle, and modular outlet plates. Blank cover plates to be installed where no accessories are installed. Toggles white, red or blue				
j)	9 way Cluster Box	1	No		
	Supply and Install 9 WAY Clustar Boxes comprising of; 1 x S.A. clean socket outlet (red Ded) 1 x S.A. 2 pin socket outlet 2 x Data blank bezels (RJ 45)				
	GENERAL LIGHTING				
	Supply and install PVC conduit - surface, chased into brickwork (patching by others) or cast in				
k)	20mm	100	m		
	CARRIED TO COLLECTION PAGE			R	0.00

	BILL No. 7 - WORKSHOPS SMALL POWER AND LIGHTING	QTY	UNIT	RATE	TOTAL
a)	25mm	45	m		
	Supply and install PVC conduit boxes - surface, chased into brickwork for screws.				
b)	65mmØ round outlet box	40	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes.				
c)	5 A 3 pin socket outlet in conduit box	2	No.		
d)	1 lever, 1 way light switch	4	No.		
e)	2 lever, 1 way light switch in 100x100 box	2	No.		
	in trunking or drawn into conduit and coloured as required:-				
f)	2.5 mm²	150	m		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
g)	2.5 mm² 2 core	85	m		
	Extra on last for glands, terminations and connection				
h)	2.5 mm² 2 core	8	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
i)	P9000	10	m		
	Supply and install mains switching soffit mounted motion/daylight sensors (BEG Luxomat or equal and approved).				
j)	Luxomat PD3 (1 channel - lighting)	5	No		
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COLLECTION PAGE for BILL No. 7

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TOTAL FOR BILL No. 7 CARRIED TO SUMMARY

	BILL No. 8 - OCCUPATIONAL THERAPY SMALL POWER AND LIGHTIN(	QTY	UNIT		
	SMALL POWER				
	Supply and install PVC conduit cast into slab, including all fixings				
a)	25mm	25	m		
	Supply and install galvanised conduit boxes - Recessed.				
b)	100 x 100/50 box, complete with cover	2	No		
c)	Round conduit box, complete with cover	7	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
d)	P9000	25	m		
	Supply and install 2 compartment power skirting complete with PVC covers, splices, corners, endcaps etc.				
e)	Cabstrut powder coated galvanized steel power skirting or equal and approved	5	m		
	Supply, install and connect electrical accessories in power skirting (Cabstrut or approved equal) flush, including cradles and covers.				
f)	16 A 3 pin single switched socket outlet. Complete with white cover and toggle switch	1	No.		
g)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
h)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
i)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
j)	Data socket	1	No.		
	Supply, install and connect electrical accessories (Cabstrut or approved equal) including covers and boxes. Toggle White, Red or Blue				
k)	16 A 3 pin single switched socket outlet including 2 prong + earth socket (flush) Complete with with toggle and white cover.	3	No.		
l)	Double 16 A 3 pin single switched socket outlet (flush) complete with white cover and toggle	1	No.		
m)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
	CARRIED TO COLLECTION PAGE				

	BILL No. 8 - OCCUPATIONAL THERAPY SMALL POWER AND LIGHTIN(	QTY	UNIT		
a)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
b)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes. Toggle White, Red or Blue				
c)	20 A SP isolator in conduit box (surface or flush)	1	No.		
d)	30 A TP industrial isolator in conduit box (surface)	1	No.		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
e)	4 mm² 2 core	15	m		
	Extra on last for glands, terminations and connection				
f)	4 mm² 2 core	12	No		
	Supply and install PVC insulated 1 000 V grade hard drawn copper wire in trunking or drawn into conduit and coloured as required:-				
g)	1.5 mm² left in conduit/trunking as draw wire	150	m		
h)	2.5 mm²	195	m		
i)	4 mm²	250	m		
	Supply and install partition / cluster boxes - surface, chased into brickwork (patching by others) or cast in. (Crabtree or approved equal) including universal cradle, and modular outlet plates. Blank cover plates to be installed where no accessories are installed. Toggles white, red or blue				
j)	9 way Cluster Box	1	No		
k)	Supply and Install 9 WAY Clustar Boxes comprising of; 1 x S.A. clean socket outlet (red Ded) 1 x S.A. 2 pin socket outlet 2 x Data blank bezels (RJ 45)				
	GENERAL LIGHTING				
	Supply and install PVC conduit - surface, chased into brickwork (patching by others) or cast in				
l)	20mm	35	m		
		2			
	CARRIED TO COLLECTION PAGE				

	BILL No. 8 - OCCUPATIONAL THERAPY SMALL POWER AND LIGHTIN(	QTY	UNIT		
a)	25mm	55	m		
	Supply and install PVC conduit boxes - surface, chased into brickwork for screws.				
b)	65mmØ round outlet box	12	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes.				
c)	5 A 3 pin socket outlet in conduit box	1	No.		
d)	1 lever, 1 way light switch	1	No.		
e)	2 lever, 1 way light switch in 100x100 box	1	No.		
	in trunking or drawn into conduit and coloured as required:-				
f)	2.5 mm²	155	m		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
g)	2.5 mm² 2 core	245	m		
	Extra on last for glands, terminations and connection				
h)	2.5 mm² 2 core	236	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
i)	P9000	6	m		
	(BEG Luxomat or equal and approved).				
j)	Luxomat PD3 (1 channel - lighting)	2	No		
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COLLECTION PAGE for BILL No. 8

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TOTAL FOR BILL No. 8 CARRIED TO SUMMARY

	BILL No. 9 - OCCUPATIONAL HEALTH SMALL POWER AND LIGHTING	QTY	UNIT		
	SMALL POWER				
	Supply and install PVC conduit cast into slab, including all fixings				
a)	25mm	55	m		
	Supply and install galvanised conduit boxes - Recessed.				
b)	100 x 100/50 box, complete with cover	3	No		
c)	Round conduit box, complete with cover	19	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
d)	P9000	10	m		
	Supply and install 2 compartment power skirting complete with PVC covers, splices, corners, endcaps etc.				
e)	Cabstrut powder coated galvanized steel power skirting or equal and approved	5	m		
	Supply, install and connect electrical accessories in power skirting (Cabstrut or approved equal) flush, including cradles and covers.				
f)	16 A 3 pin single switched socket outlet. Complete with white cover and toggle switch	1	No.		
g)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
h)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
i)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
j)	Data socket	2	No.		
	Supply, install and connect electrical accessories (Cabstrut or approved equal) including covers and boxes. Toggle White, Red or Blue				
k)	16 A 3 pin single switched socket outlet including 2 prong + earth socket (flush) Complete with with toggle and white cover.	2	No.		
l)	Double 16 A 3 pin single switched socket outlet (flush) complete with white cover and toggle	2	No.		
m)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
	CARRIED TO COLLECTION PAGE				

	BILL No. 9 - OCCUPATIONAL HEALTH SMALL POWER AND LIGHTING	QTY	UNIT		
a)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
b)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes. Toggle White, Red or Blue				
c)	20 A SP isolator in conduit box (surface or flush)	1	No.		
d)	30 A TP industrial isolator in conduit box (surface)	1	No.		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
e)	4 mm² 2 core	45	m		
	Extra on last for glands, terminations and connection				
f)	4 mm² 2 core	48	No		
	Supply and install PVC insulated 1 000 V grade hard drawn copper wire in trunking or drawn into conduit and coloured as required:-				
g)	1.5 mm² left in conduit/trunking as draw wire	158	m		
h)	2.5 mm²	215	m		
i)	4 mm²	225	m		
	Supply and install partition / cluster boxes - surface, chased into brickwork (patching by others) or cast in. (Crabtree or approved equal) including universal cradle, and modular outlet plates. Blank cover plates to be installed where no accessories are installed. Toggles white, red or blue				
j)	9 way Cluster Box	1	No		
k)	Supply and Install 9 WAY Clustar Boxes comprising of; 1 x S.A. clean socket outlet (red Ded) 1 x S.A. 2 pin socket outlet 2 x Data blank bezels (RJ 45)				
	GENERAL LIGHTING				
	Supply and install PVC conduit - surface, chased into brickwork (patching by others) or cast in				
l)	20mm	45	m		
m)	25mm	55	m		
	CARRIED TO COLLECTION PAGE				

	BILL No. 9 - OCCUPATIONAL HEALTH SMALL POWER AND LIGHTING	QTY	UNIT		
a)	Supply and install PVC conduit boxes - surface, chased into brickwork for screws.				
	65mmØ round outlet box	19	No.		
b)	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes.				
c)	5 A 3 pin socket outlet in conduit box	1	No.		
d)	1 lever, 1 way light switch	2	No.		
e)	2 lever, 1 way light switch in 100x100 box	2	No.		
	in trunking or drawn into conduit and coloured as required:-				
f)	2.5 mm²	145	m		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
g)	2.5 mm² 2 core	115	m		
	Extra on last for glands, terminations and connection				
h)	2.5 mm² 2 core	4	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
i)	P9000	25	m		
	(BEG Luxomat or equal and approved).				
j)	Luxomat PD3 (1 channel - lighting)	9	No		
	CARRIED TO COLLECTION PAGE				

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TOTAL FOR BILL No. 9 CARRIED TO SUMMARY	

	BILL No. 10 - LAUNDRY SMALL POWER AND LIGHTING	QTY	UNIT		
	SMALL POWER				
	Supply and install PVC conduit cast into slab, including all fixings				
a)	25mm	110	m		
	Supply and install galvanised conduit boxes - Recessed.				
b)	100 x 100/50 box, complete with cover	5	No		
c)	Round conduit box, complete with cover	90	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
d)	P9000	35	m		
	Supply and install 2 compartment power skirting complete with PVC covers, splices, corners, endcaps etc.				
e)	Cabstrut powder coated galvanized steel power skirting or equal and approved	5	m		
	Supply, install and connect electrical accessories in power skirting (Cabstrut or approved equal) flush, including cradles and covers.				
f)	16 A 3 pin single switched socket outlet. Complete with white cover and toggle switch	2	No.		
g)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
h)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
i)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
j)	Data socket	1	No.		
	Supply, install and connect electrical accessories (Cabstrut or approved equal) including covers and boxes. Toggle White, Red or Blue				
k)	16 A 3 pin single switched socket outlet including 2 prong + earth socket (flush) Complete with with toggle and white cover.	1	No.		
l)	Double 16 A 3 pin single switched socket outlet (flush) complete with white cover and toggle	1	No.		
m)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
	CARRIED TO COLLECTION PAGE				

	BILL No. 10 - LAUNDRY SMALL POWER AND LIGHTING	QTY	UNIT		
a)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
b)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes. Toggle White, Red or Blue				
c)	20 A SP isolator in conduit box (surface or flush)	1	No.		
d)	30 A TP industrial isolator in conduit box (surface)	1	No.		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
e)	4 mm² 2 core	55	m		
	Extra on last for glands, terminations and connection				
f)	4 mm² 2 core	65	No		
	Supply and install PVC insulated 1 000 V grade hard drawn copper wire in trunking or drawn into conduit and coloured as required:-				
g)	1.5 mm² left in conduit/trunking as draw wire	56	m		
h)	2.5 mm²	155	m		
i)	4 mm²	175	m		
	Supply and install partition / cluster boxes - surface, chased into brickwork (patching by others) or cast in. (Crabtree or approved equal) including universal cradle, and modular outlet plates. Blank cover plates to be installed where no accessories are installed. Toggles white, red or blue				
j)	9 way Cluster Box	1	No		
k)	Supply and Install 9 WAY Clustar Boxes comprising of; 1 x S.A. clean socket outlet (red Ded) 1 x S.A. 2 pin socket outlet 2 x Data blank bezels (RJ 45)				
	GENERAL LIGHTING				
	Supply and install PVC conduit - surface, chased into brickwork (patching by others) or cast in				
l)	20mm	45	m		
		2			
	CARRIED TO COLLECTION PAGE				

	BILL No. 10 - LAUNDRY SMALL POWER AND LIGHTING	QTY	UNIT		
a)	25mm	35	m		
	Supply and install PVC conduit boxes - surface, chased into brickwork for screws.				
b)	65mmØ round outlet box	90	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes.				
c)	5 A 3 pin socket outlet in conduit box	2	No.		
d)	1 lever, 1 way light switch	2	No.		
e)	2 lever, 1 way light switch in 100x100 box	2	No.		
	in trunking or drawn into conduit and coloured as required:-				
f)	2.5 mm²	65	m		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
g)	2.5 mm² 2 core	85	m		
	Extra on last for glands, terminations and connection				
h)	2.5 mm² 2 core	15	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
i)	P9000	45	m		
	(BEG Luxomat or equal and approved).				
j)	Luxomat PD3 (1 channel - lighting)	16	No		
	CARRIED TO COLLECTION PAGE				

COLLECTION PAGE for BILL No. 10

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TOTAL FOR BILL No. 10 CARRIED TO SUMMARY

	BILL No. 11 - CRISIS CENTRE SMALL POWER AND LIGHTING	QTY	UNIT		
	SMALL POWER				
	Supply and install PVC conduit cast into slab, including all fixings				
a)	25mm	55	m		
	Supply and install galvanised conduit boxes - Recessed.				
b)	100 x 100/50 box, complete with cover	4	No		
c)	Round conduit box, complete with cover	19	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
d)	P9000	15	m		
	Supply and install 2 compartment power skirting complete with PVC covers, splices, corners, endcaps etc.				
e)	Cabstrut powder coated galvanized steel power skirting or equal and approved	5	m		
	Supply, install and connect electrical accessories in power skirting (Cabstrut or approved equal) flush, including cradles and covers.				
f)	16 A 3 pin single switched socket outlet. Complete with white cover and toggle switch	2	No.		
g)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
h)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
i)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
j)	Data socket	1	No.		
	Supply, install and connect electrical accessories (Cabstrut or approved equal) including covers and boxes. Toggle White, Red or Blue				
k)	16 A 3 pin single switched socket outlet including 2 prong + earth socket (flush) Complete with with toggle and white cover.	1	No.		
l)	Double 16 A 3 pin single switched socket outlet (flush) complete with white cover and toggle	1	No.		
m)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
	CARRIED TO COLLECTION PAGE				

	BILL No. 11 - CRISIS CENTRE SMALL POWER AND LIGHTING	QTY	UNIT		
a)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
b)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes. Toggle White, Red or Blue				
c)	20 A SP isolator in conduit box (surface or flush)	1	No.		
d)	30 A TP industrial isolator in conduit box (surface)	1	No.		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
e)	4 mm² 2 core	55	m		
	Extra on last for glands, terminations and connection				
f)	4 mm² 2 core	65	No		
	Supply and install PVC insulated 1 000 V grade hard drawn copper wire in trunking or drawn into conduit and coloured as required:-				
g)	1.5 mm² left in conduit/trunking as draw wire	56	m		
h)	2.5 mm²	155	m		
i)	4 mm²	175	m		
	Supply and install partition / cluster boxes - surface, chased into brickwork (patching by others) or cast in. (Crabtree or approved equal) including universal cradle, and modular outlet plates. Blank cover plates to be installed where no accessories are installed. Toggles white, red or blue				
j)	9 way Cluster Box	1	No		
k)	Supply and Install 9 WAY Clustar Boxes comprising of; 1 x S.A. clean socket outlet (red Ded) 1 x S.A. 2 pin socket outlet 2 x Data blank bezels (RJ 45)				
	GENERAL LIGHTING				
	Supply and install PVC conduit - surface, chased into brickwork (patching by others) or cast in				
l)	20mm	45	m		
		2			
	CARRIED TO COLLECTION PAGE				

	BILL No. 11 - CRISIS CENTRE SMALL POWER AND LIGHTING	QTY	UNIT		
a)	25mm	35	m		
	Supply and install PVC conduit boxes - surface, chased into brickwork for screws.				
b)	65mmØ round outlet box	19	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes.				
c)	5 A 3 pin socket outlet in conduit box	2	No.		
d)	1 lever, 1 way light switch	19	No.		
e)	2 lever, 1 way light switch in 100x100 box	2	No.		
	in trunking or drawn into conduit and coloured as required:-				
f)	2.5 mm²	65	m		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
g)	2.5 mm² 2 core	85	m		
	Extra on last for glands, terminations and connection				
h)	2.5 mm² 2 core	15	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
i)	P9000	15	m		
	(BEG Luxomat or equal and approved).				
j)	Luxomat PD3 (1 channel - lighting)	18	No		
	CARRIED TO COLLECTION PAGE				

COLLECTION PAGE for BILL No. 11

TOTAL from PAGE No. 2/23

TOTAL from PAGE No. 2/24

TOTAL from PAGE No. 2/25

TOTAL FOR BILL No. 11 CARRIED TO SUMMARY

	BILL No. 12 - MORTUARY SMALL POWER AND LIGHTING	QTY	UNIT		
	SMALL POWER				
	Supply and install PVC conduit cast into slab, including all fixings				
a)	25mm	55	m		
	Supply and install galvanised conduit boxes - Recessed.				
b)	100 x 100/50 box, complete with cover	3	No		
c)	Round conduit box, complete with cover	9	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
d)	P9000	10	m		
	Supply and install 2 compartment power skirting complete with PVC covers, splices, corners, endcaps etc.				
e)	Cabstrut powder coated galvanized steel power skirting or equal and approved	3	m		
	Supply, install and connect electrical accessories in power skirting (Cabstrut or approved equal) flush, including cradles and covers.				
f)	16 A 3 pin single switched socket outlet. Complete with white cover and toggle switch	2	No.		
g)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
h)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
i)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
j)	Data socket	1	No.		
	Supply, install and connect electrical accessories (Cabstrut or approved equal) including covers and boxes. Toggle White, Red or Blue				
k)	16 A 3 pin single switched socket outlet including 2 prong + earth socket (flush) Complete with with toggle and white cover.	1	No.		
l)	Double 16 A 3 pin single switched socket outlet (flush) complete with white cover and toggle	1	No.		
m)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
	CARRIED TO COLLECTION PAGE				

	BILL No. 12 - MORTUARY SMALL POWER AND LIGHTING	QTY	UNIT		
a)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
b)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes. Toggle White, Red or Blue				
c)	20 A SP isolator in conduit box (surface or flush)	1	No.		
d)	30 A TP industrial isolator in conduit box (surface)	1	No.		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
e)	4 mm² 2 core	55	m		
	Extra on last for glands, terminations and connection				
f)	4 mm² 2 core	65	No		
	Supply and install PVC insulated 1 000 V grade hard drawn copper wire in trunking or drawn into conduit and coloured as required:-				
g)	1.5 mm² left in conduit/trunking as draw wire	56	m		
h)	2.5 mm²	155	m		
i)	4 mm²	175	m		
	Supply and install partition / cluster boxes - surface, chased into brickwork (patching by others) or cast in. (Crabtree or approved equal) including universal cradle, and modular outlet plates. Blank cover plates to be installed where no accessories are installed. Toggles white, red or blue				
j)	9 way Cluster Box	1	No		
k)	Supply and Install 9 WAY Clustar Boxes comprising of; 1 x S.A. clean socket outlet (red Ded) 1 x S.A. 2 pin socket outlet 2 x Data blank bezels (RJ 45)				
	GENERAL LIGHTING				
	Supply and install PVC conduit - surface, chased into brickwork (patching by others) or cast in				
l)	20mm	45	m		
		2			
	CARRIED TO COLLECTION PAGE				

	BILL No. 12 - MORTUARY SMALL POWER AND LIGHTING	QTY	UNIT		
a)	25mm	35	m		
	Supply and install PVC conduit boxes - surface, chased into brickwork for screws.				
b)	65mmØ round outlet box	25	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes.				
c)	5 A 3 pin socket outlet in conduit box	25	No.		
d)	1 lever, 1 way light switch	2	No.		
e)	2 lever, 1 way light switch in 100x100 box	2	No.		
	in trunking or drawn into conduit and coloured as required:-				
f)	2.5 mm²	65	m		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
g)	2.5 mm² 2 core	85	m		
	Extra on last for glands, terminations and connection				
h)	2.5 mm² 2 core	15	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
i)	P9000	28	m		
	(BEG Luxomat or equal and approved).				
j)	Luxomat PD3 (1 channel - lighting)	2	No		
	CARRIED TO COLLECTION PAGE				

COLLECTION PAGE for BILL No. 12

TOTAL from PAGE No. 2/23

TOTAL from PAGE No. 2/24

TOTAL from PAGE No. 2/25

TOTAL FOR BILL No. 12 CARRIED TO SUMMARY

	BILL No. 13 - DOCTORS HOUSE SMALL POWER AND LIGHTING	QTY	UNIT		
	SMALL POWER				
	Supply and install PVC conduit cast into slab, including all fixings				
a)	25mm	25	m		
	Supply and install galvanised conduit boxes - Recessed.				
b)	100 x 100/50 box, complete with cover	2	No		
c)	Round conduit box, complete with cover	6	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
d)	P9000	10	m		
	Supply and install 2 compartment power skirting complete with PVC covers, splices, corners, endcaps etc.				
e)	Cabstrut powder coated galvanized steel power skirting or equal and approved	1	m		
	Supply, install and connect electrical accessories in power skirting (Cabstrut or approved equal) flush, including cradles and covers.				
f)	16 A 3 pin single switched socket outlet. Complete with white cover and toggle switch	2	No.		
g)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
h)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
i)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
j)	Data socket	1	No.		
	Supply, install and connect electrical accessories (Cabstrut or approved equal) including covers and boxes. Toggle White, Red or Blue				
k)	16 A 3 pin single switched socket outlet including 2 prong + earth socket (flush) Complete with with toggle and white cover.	1	No.		
l)	Double 16 A 3 pin single switched socket outlet (flush) complete with white cover and toggle	1	No.		
m)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
	CARRIED TO COLLECTION PAGE				

	BILL No. 13 - DOCTORS HOUSE SMALL POWER AND LIGHTING	QTY	UNIT		
a)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
b)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes. Toggle White, Red or Blue				
c)	20 A SP isolator in conduit box (surface or flush)	1	No.		
d)	30 A TP industrial isolator in conduit box (surface)	1	No.		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
e)	4 mm² 2 core	55	m		
	Extra on last for glands, terminations and connection				
f)	4 mm² 2 core	65	No		
	Supply and install PVC insulated 1 000 V grade hard drawn copper wire in trunking or drawn into conduit and coloured as required:-				
g)	1.5 mm² left in conduit/trunking as draw wire	15	m		
h)	2.5 mm²	125	m		
i)	4 mm²	60	m		
	Supply and install partition / cluster boxes - surface, chased into brickwork (patching by others) or cast in. (Crabtree or approved equal) including universal cradle, and modular outlet plates. Blank cover plates to be installed where no accessories are installed. Toggles white, red or blue				
j)	9 way Cluster Box	1	No		
k)	Supply and Install 9 WAY Clustar Boxes comprising of; 1 x S.A. clean socket outlet (red Ded) 1 x S.A. 2 pin socket outlet 2 x Data blank bezels (RJ 45)				
	GENERAL LIGHTING				
	Supply and install PVC conduit - surface, chased into brickwork (patching by others) or cast in				
l)	20mm	45	m		
		2			
	CARRIED TO COLLECTION PAGE				

	BILL No. 13 - DOCTORS HOUSE SMALL POWER AND LIGHTING	QTY	UNIT		
a)	25mm	35	m		
	Supply and install PVC conduit boxes - surface, chased into brickwork for screws.				
b)	65mmØ round outlet box	6	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes.				
c)	5 A 3 pin socket outlet in conduit box	1	No.		
d)	1 lever, 1 way light switch	2	No.		
e)	2 lever, 1 way light switch in 100x100 box	2	No.		
	in trunking or drawn into conduit and coloured as required:-				
f)	2.5 mm²	65	m		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
g)	2.5 mm² 2 core	85	m		
	Extra on last for glands, terminations and connection				
h)	2.5 mm² 2 core	15	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
i)	P9000	10	m		
	(BEG Luxomat or equal and approved).				
j)	Luxomat PD3 (1 channel - lighting)	1	No		
	CARRIED TO COLLECTION PAGE				

COLLECTION PAGE for BILL No. 13

TOTAL from PAGE No. 2/23

TOTAL from PAGE No. 2/24

TOTAL from PAGE No. 2/25

TOTAL FOR BILL No. 13 CARRIED TO SUMMARY

	BILL No. 14 - PUMP HOUSE,TUCK SHOP AND SERVER ROOM SMALL POWER AND LIGHTING	QTY	UNIT		
	SMALL POWER				
	Supply and install PVC conduit cast into slab, including all fixings				
a)	25mm	55	m		
	Supply and install galvanised conduit boxes - Recessed.				
b)	100 x 100/50 box, complete with cover	3	No		
c)	Round conduit box, complete with cover	10	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
d)	P9000	5	m		
	Supply and install 2 compartment power skirting complete with PVC covers, splices, corners, endcaps etc.				
e)	Cabstrut powder coated galvanized steel power skirting or equal and approved	1	m		
	Supply, install and connect electrical accessories in power skirting (Cabstrut or approved equal) flush, including cradles and covers.				
f)	16 A 3 pin single switched socket outlet. Complete with white cover and toggle switch	2	No.		
g)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
h)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
i)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
j)	Data socket	1	No.		
	Supply, install and connect electrical accessories (Cabstrut or approved equal) including covers and boxes. Toggle White, Red or Blue				
k)	16 A 3 pin single switched socket outlet including 2 prong + earth socket (flush) Complete with with toggle and white cover.	1	No.		
l)	Double 16 A 3 pin single switched socket outlet (flush) complete with white cover and toggle	1	No.		
m)	16 A 3 pin single switched socket outlet. Complete with white cover and red toggle switch	1	No.		
	CARRIED TO COLLECTION PAGE				

	BILL No. 14 - PUMP HOUSE,TUCK SHOP AND SERVER ROOM SMALL POWER AND LIGHTING	QTY	UNIT		
a)	16 A 3 pin single switched socket outlet, Complete with white cover and blue toggle switch	1	No.		
b)	16 A 3 pin single switched socket outlet, Complete with red cover and red toggle switch. Chamfered earth pin.	1	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes. Toggle White, Red or Blue				
c)	20 A SP isolator in conduit box (surface or flush)	1	No.		
d)	30 A TP industrial isolator in conduit box (surface)	1	No.		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
e)	4 mm² 2 core	55	m		
	Extra on last for glands, terminations and connection				
f)	4 mm² 2 core	65	No		
	Supply and install PVC insulated 1 000 V grade hard drawn copper wire in trunking or drawn into conduit and coloured as required:-				
g)	1.5 mm² left in conduit/trunking as draw wire	45	m		
h)	2.5 mm²	155	m		
i)	4 mm²	85	m		
	Supply and install partition / cluster boxes - surface, chased into brickwork (patching by others) or cast in. (Crabtree or approved equal) including universal cradle, and modular outlet plates. Blank cover plates to be installed where no accessories are installed. Toggles white, red or blue				
j)	9 way Cluster Box	1	No		
k)	Supply and Install 9 WAY Clustar Boxes comprising of; 1 x S.A. clean socket outlet (red Ded) 1 x S.A. 2 pin socket outlet 2 x Data blank bezels (RJ 45)				
	GENERAL LIGHTING				
	Supply and install PVC conduit - surface, chased into brickwork (patching by others) or cast in				
l)	20mm	45	m		
		2			
	CARRIED TO COLLECTION PAGE				

	BILL No. 14 - PUMP HOUSE,TUCK SHOP AND SERVER ROOM SMALL POWER AND LIGHTING	QTY	UNIT		
a)	25mm	35	m		
	Supply and install PVC conduit boxes - surface, chased into brickwork for screws.				
b)	65mmØ round outlet box	10	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes.				
c)	5 A 3 pin socket outlet in conduit box	2	No.		
d)	1 lever, 1 way light switch	2	No.		
e)	2 lever, 1 way light switch in 100x100 box	2	No.		
	in trunking or drawn into conduit and coloured as required:-				
f)	2.5 mm²	65	m		
	Supply and install twin and earth wire lay in ceiling or clipped to structure				
g)	2.5 mm² 2 core	85	m		
	Extra on last for glands, terminations and connection				
h)	2.5 mm² 2 core	15	No		
	Supply and install galvanised wiring duct complete with PVC cover, hangers, connectors, splices, endcaps etc.				
i)	P9000	10	m		
	(BEG Luxomat or equal and approved).				
j)	Luxomat PD3 (1 channel - lighting)	3	No		
	CARRIED TO COLLECTION PAGE				

COLLECTION PAGE for BILL No. 14

TOTAL from PAGE No. 2/23

TOTAL from PAGE No. 2/24

TOTAL from PAGE No. 2/25

TOTAL FOR BILL No. 14 CARRIED TO SUMMARY

	BILL No. 15 - AUXILLARY AND EXTERNAL SMALL POWER AND LIGHTING	QTY	UNIT		
	GENERAL LIGHTING				
	Supply and install PVC conduit - surface, chased into brickwork (patching by others) or cast in				
a)	20mm	80	m		
b)	25mm	45	m		
	Supply and install PVC conduit boxes - surface, chased into brickwork (patching by others) or cast in. Boxes to be complete with brass inserts for screws.				
c)	65mmØ round outlet box	25	No.		
	Supply, install and connect electrical accessories (Crabtree or approved equal) including covers and boxes.				
d)	5 A 3 pin socket outlet in conduit box	5	No.		
e)	1 lever, 1 way light switch	5	No.		
	Supply and install PVC insulated 1 000 V grade hard drawn copper wire in trunking or drawn into conduit and coloured as required:-				
f)	2.5 mm²	65	m		
	Supply and install Twin and Earth cable lay in ceiling or clipped to structure				
g)	2.5 mm²	100	m		
	Extra on last for glands, terminations and connection				
h)	2.5 mm²	6	No		
	TOTAL FOR BILL No. 15 CARRIED TO SUMMARY				

	BILL No.16 EARTHING AND LIGHTNING PROTECTION	QTY	UNIT		
	EARTHING AND LIGHTNING PROTECTION				
	This installation includes for the carrying out of the required soil survey on site, the issuing of the test reports, the design of the required system (if required) in accordance with SABS, the suppply and installation of the design for the systen, the carrying out of the SABS prescribed test after completion of the installation and issuing of a complete certificate.				
	EARTHING AND LIGHTNING PROTECTION				
	Supply and install the following:				
	Galvanised conduit laid in trench (trench and backfilling elsewhere measured).				
a)	25mm diameter hot dipped galvanised conduit.	204	m		
b)	70mm² PVC insulated copper wire conductor.	204	m		
	EARTH ELECTRODES				
c)	1800mm Long copper earth rod driven into ground.	68	No.		
	Bonding and termination of down conductor and bonding conductor, including all lugs, accessories, etc:				
d)	Complete bonding of down conductor on roof and sheet trusses	68	No.		
e)	Complete termination of bonding conductor in joint box and on earth electrode.	68	No.		
f)	Joint box fixed 200mm above ground level.	68	No.		
g)	Allow for carrying out the required resistivity tests on site and issuing of report with the test results, as well as recommendations on the appropriate earthing design, for both the School Building and the Toilets.		Item		
	TOTAL FOR BILL No. 16 CARRIED TO COLLECTION PAGE				

	BILL No.16 EARTHING AND LIGHTNING PROTECTION	QTY	UNIT		
	EARTHING AND LIGHTNING PROTECTION				
a)	Allow for the testing of the completed systems and the issue of the SABS prescribed certificates.		Item		
	Supply and install the following:				
b)	Allow for the required maintenance of the systems for the full maintenance period including a final test reading before the end of the period.		Item		
	Earthing system:				
c)	Earthing of geyser installation at geyser, complete with standard copper tape earth strapping and 2,5mm² bare copper earth wire.	2	No.		
d)	Earthing of wash hand basins and all cold and hot water piping, by means of standard copper tape earth strapping at regular intervals of 6m and connecting same to the electrical earth system at the distribution board.		Item		
e)	Allow for bonding of all other metal objects as required		Item		
	CARRIED TO COLLECTION PAGE				
	COLLECTION PAGE for BILL No. 16				

TOTAL from PAGE No. 2/28

TOTAL from PAGE No. 2/29

TOTAL FOR BILL No. 16 CARRIED TO SUMMARY

BILL SUMMARY

BILL No. 1 - PRELIMINARY AND GENERAL

BILL No. 2 - GENERAL ITEMS

BILL No. 3 - CABLE LADDERS

BILL No. 4 - CABLING

BILL No. 5 - DISTRIBUTION BOARDS

BILL No. 6 - LUMINAIRES

BILL No. 7 - WORKSHOPS SMALL POWER AND LIGHTING

BILL No. 8 - 0CCUPATIONAL THERAPY SMALL POWER AND LIGHTING

BILL No. 9 - OCCUPATIONAL HEALTH AUDOMETRY SMALL POWER AND LIGHTING

BILL No. 10 - LAUNDRY SMALL POWER AND LIGHTING

BILL No. 11 - CRISIS CENTRE AND WOMENS HEALTH SMALL POWER AND LIGHTING

BILL No. 12 - MORTUARY SMALL POWER AND LIGHTING

BILL No. 13 - DOCTORS HOUSE SMALL POWER AND LIGHTING

BILL No. 14 - PUMP HOUSE, TUCK SHOP AND SERVER SMALL POWER AND LIGHTING

BILL No. 15 - AUXILLARY AND EXTERNAL SMALL POWER AND LIGHTING

BILL No. 16 - EARTHING AND B19LIGHTNING PROTECTION

TOTAL TENDER PRICE EXCLUDING VAT - CARRIED TO FORM OR TENDER

SPECIFICATION FOR THE ELECTRONIC INSTALLATION
ST ANDREWS HOSPITAL - ASBESTOS ERADICATION

SECTION TWO

BUDGET BILLS OF QUANTITIES

INDEX

GENERAL NOTES

BILL No. 1 - PRELIMINARY AND GENERAL

BILL No. 2 - GENERAL ITEMS

BILL No. 7 - SMOKE DETECTION

BILL No. 4 - PUBLIC ADDRESS

SUMMARY

BILL OF QUANTITIES

GENERAL NOTES

1. This Bill of Quantities forms part of, and must be read in conjunction with the complete specification and must be submitted, duly completed, on the closing date of tenders.

2. Tenderers must complete the Bill of Quantities and detail the unit rate and total amount of each item.

   The "Total" shall constitute the tender price for adjudication.

   Tenderers are advised to check their item extension and total additions as arithmetical errors occurring in the priced Bill of Quantities cannot be considered as having an effect on the tender amount.

3. No alteration, erasure or addition is to be made in the text of the Bill of Quantities. Should any alteration, erasure or addition be made it will not be recognised but the original wording of the Bill of Quantities will be adhered to.

   The Engineer will check the completed Bill of Quantities and reserves the right to adjust any individual price and to rectify any discrepancy whilst the total tender price as quoted remains unaltered.

4. The quantities given in the Bill for cable, cable markers, earth wire laid with cable, overhead conductors, overhead earth wire and excavations cannot be regarded as exact and are subject to measurement on site after completion of the service and adjustments will be made according to the unit rates given in the Bill.

   All other quantities will not be measured on site.

   In the event of discrepa+B21ncies between the drawings, specifications and Bill of Quantities the Engineer shall decide whether the work as executed shall be remeasured on site or whether remeasurement shall be effected from the working drawings only.

5. The Bill of Quantities is to be used for pricing and financial purposes only. The drawings take precedence over the particular (project) specification but should be used in conjunction with these specifications. The Project Specification takes precedence over quality specifications and the Bill of Quantities.

   NOTE:

   Checking of Cable and Overhead Conductor Lengths. Notwithstanding the fact that lengths of cables and overhead conductors, as given in the Bill of Quantities, have been measured from scaled drawings, the Contractor shall check such lengths on site before ordering the cable as he will not be paid for excess cable after the completion of the service. Any allowance for off-cuts shall be made in the unit rates. The final measurements shall be based on the nett route length of the cables and overhead lines concerned. installed in accordance with the specification. However, the onus is on the Contractor to prove compliance with the specification.

6. The unit prices quoted in the Bill of Quantities shall include for such small materials as are required for the complete installation in accordance with the specification.

7. Bill No. 1 is to be regarded as fixed and will not be adjusted for variations in the final contract value or contract period.

   NOTE:

   Tenderers may not include the costs of the items of Bill No.1 in the unit rates for items in the remainder of the Bill of Quantities. Bill No.1 is to be completed as indicated.

   Failure to comply will result in the Engineer arbitrarily adjusting rates to exclude Preliminary and General Costs.

8. Unit prices for the same items in different Bills shall in all cases be the same, and in the case of differences, the Engineer reserves the right to change such unit prices when the completed list is checked, without adjusting the tender price.

9. The total for each page of each Bill is to be carried forward to the collection page at the end of each Bill.

10. P.C., Provisional and Contingency allowances, items and sums shall be expended as directed by the Engineer, and any balance remaining shall be deducted from the amount of the contract sum. Tenderers may not regard any unspent moneys as forming part of the final contract value.

    Variation Instruction No.1 will be issued after award of the contract to omit all P.C., Provisional and Contingency sums/allowances from the contract and authorized contract value.

11. Variation work, as well as the items described above, shall be measured as executed, and paid for according to unit prices in the Bill of Quantities. Where unit prices are not available, the work shall be priced, in conjunction with the Engineer, at current rates.

12. Unless otherwise specified in the Bill of Quantities, all items are to be priced on the basis of supply, delivery, offload, installation, connection, testing and commissioning.

    All prices are to be EXCLUSIVE OF V.A.T but inclusive of import duties, surcharges, commissions to third parties, etc., where applicable. The foregoing items, as well as the Contractor's handling, financing and profit mark-up, is not to be separately detailed, and must be included in the cost rates.

13. Unless otherwise stated, all measurements are net, in accordance with the drawings, and no allowance has been made for wastage.

14. The Employer reserves the right to increase or decrease the extent of the contract works, in accordance with the contract conditions, by issuing written variation instructions to omit or add, as may be required, the supply and/or installation of any item of equipment or work, whether listed in the Bill of Quantities or not, and without affecting the unit cost rates indicated in the Bill of Quantities or Preliminary and General items.

15. In the event that Tenderers disagree with the measured quantities the tender should be qualified accordingly, listing the items and quantities in question.

16. The unit prices quoted in the Bill of Quantities must include for small installation materials such as nuts, bolts, nails, saddles, screws etc. as are required for the satisfactory complete installation in accordance with the specification.

17. Unless otherwise stated in the Bill, the unit cost rates shall be based on the following:

    The rate for conduit boxes and for outlet boxes up to and including 100 x 100 mm shall be the same regardless of the number of entries.

    The rate for conduit and outlet boxes shall include for fixing to the conduit with lock and bushnuts as may be required and for fixing to the building structure.

    The rate for outlet boxes shall be without covers and draw boxes shall be complete with covers and screws.

    The rate for industrial switch and plug units shall include for the relevant enclosure and fixing to conduit and building structure.

    The rate for light switches, switch plugs, dimmer units, etc., shall include for screws, cover plates and fuses/breakers where applicable and for connection of wiring thereto.

    The rate for conduit up to and including 25 mm diameter shall include all couplings, bends, boxes etc. as may be required.

    The rate for luminaires and accessories shall include for connection of the wiring thereto.

18. All measurements are based on the most economical route lengths without any allowance for wastage, jointing or slack.

19. In the case of wiring in conduit, an allowance of 300 mm per wire outlet box position has been made and in the case of cables and wiring entering switchboards, an allowance of 1000 and 2000 mm has been made for termination purposes in sub-distribution and main distribution boards respectively.

20. It should be noted that, notwithstanding anything to the contrary, any items completed or listed in the Bill of Quantities by the Tenderer will not be taken into account, will not be subject to re-measurement, and will not be regarded as a Bill of Quantities item.

21. Where equipment is specified by name, the tenderer must price on this basis. Alternatives may be offered by tenderers but the use of which is subject to written approval by the Engineer.

BILL No. 1 PRELIMINARY AND GENERAL	QTY	UNIT	RATE	TOTAL
ELECTRONIC INSTALLATION				
The costs for the following items shall not be included in thecost rates for work listed in the rest of the Bill of Quantities.				
a) Cost for compliance with Contractor's preliminary and general items not covered below.	Item			
b) Contractual requirements as specified, i.e guarantees, insurance, sureties, company's overheads administration etc.	Item			
c) Contract engineer, administration, supervision, programming and management.	Item			
d) Establish site accommodation, storage etc.	Item			
e) Maintain and operate site establishment.	Item			
f) Remove site establishment on completion and remove all rubbish, foundations, concrete bases, dirt oil spillage, etc, and leave site in condition as found.	Item			
g) Tools, equipment, plant hire and testing gear/meters as necessary.	Item			
h) Other items not included in the foregoing and required by the Contractor are to be listed and priced below.	Item			
TOTAL FOR BILL No. 1 CARRIED TO SUMMARY			R	

	BILL No. 2 GENERAL ITEMS	QTY	UNIT	RATE	TOTAL
	GENERAL				
a)	Liase with Telecommunications provider for the approval of Comms room and underground sleeves around the ste	Item			
b)	Liason with various sub-contractors in regard to phasing and timing of the works	Item			
	TESTING & COMMISSIONING				
c)	Collate the "as built drawings" and manuals for correctly indexed, and submit to the Engineer for review	Item			
	HANDOVER				
d)	Budgetary allowance to produce and print As Built CAD drawings.	Item			
e)	Budgetary allowance for technical authoring of As Built manuals.	Item			
	GUARANTEES				
f)	Maintenance and guarantee of the complete installation including fitting, material and workmanship for a period of twelve months from date of completion and handover	Item			
	TOTAL FOR BILL No. 2 CARRIED TO SUMMARY			R	

	BILL No. 3 - SMOKE DETECTION SYSTEM	QTY	UNIT	RATE	TOTAL
	Supply, install, test and commission ZITON ZP2 (or equal and approved) smoke detection and alarm system complete with connectors, adapters, fixings, power sockets, cables, consumables and all material to complete the installation				
	Analogue addressable fire panels with master / slave network connections, complete with backup batteries and programming.				
a)	Master 4 loop, 40 zone	1	No.		
b)	Slave 4 loop, 40 zone	1	No.		
c)	Repeater panel	4	No.		
	Addressable base mounted detectors, complete with base and fixings for floor void, ceiling, soffit/structure or wall mounting, and terminations.				
d)	Optical sensor - under ceiling	108	No.		
e)	Optical sensor - Soffit mounted	2	No.		
f)	Optical sensor - ceiling void	4	No.		
g)	Heat sensor	3	No.		
h)	Rate of rise temparature sensor	3	No.		
i)	Extra on last for base sounder	10	No.		
j)	Extra on last for base sounder with beacon	10	No.		
	Addressable field devices, complete with fixings for ceiling, soffit/structure or wall mounting, and terminations.				
k)	Manual call point with isolator (resettable)	14	No.		
l)	IO unit with isolator (complete with hinged lid enclosure)	4	No.		
m)	Multi tone sounder/strobe	10	No.		
n)	Surface mount door hold open magnet complete with universal stainless steel adjustable bracket and emergency release button and door anchor plate (400N) and power supplies.	10	No.		
	CARRIED TO COLLECTION PAGE			R	

	BILL No. 3 - SMOKE DETECTION SYSTEM	QTY	UNIT	RATE	TOTAL
	Supply and installation of cable (red) on cable basket in ceiling void or drawn into conduit as specified, including all lables and terminations at both ends.				
a)	PH120 2 core, 1.5mm² stranded fire rated cable (red)	2 500	m		
b)	PH120 2 core, 2.5mm² stranded fire rated cable (red)	1 000	m		
c)	Connectors, adapters, power sockets, cables, consumables and other material to complete the installation as intended.	Item			
d)	Termination junction boxes in electronics risers complete with terminals	2	No		
e)	Staff System Training	Item			
	CARRIED TO COLLECTION PAGE			R	

COLLECTION PAGE for BILL No. 3

TOTAL from PAGE No. 4/7	R
TOTAL from PAGE No. 4/8	R
TOTAL FOR BILL No. 3 CARRIED TO SUMMARY	R

BILL SUMMARY

BILL No. 1 - PRELIMINARY AND GENERAL	R
BILL No. 2 - GENERAL ITEMS	R
BILL No. 3 - SMOKE DETECTION	R
TOTAL TENDER PRICE EXCLUDING VAT	R
TOTAL CARRIED TO PAGE 61 OF THE MAIN BOQ	R

Item No		Quantity	Rate	Amount
	SECTION 5			
	BILL NO. 1			
	The Tenderer is referred to the relevant Clauses in the separate document DOH Standard Preambles for All Trades			
	MECHANICAL INSTALLATION (PROVISIONAL)			
	(CPAP WORK GROUP NO. 170-173 UNLESS OTHERWISE STATED)			
	Tenderers are to note that the sum included in the amount column of this section of the Bill of Quantities, should be the total of all priced items in the Mechanical Installation, Bill of Quantities as attached hereafter.			
1	Mechanical Installation (transferred from page 133 of Mechanical Installation BOQ attached hereafter)		SUM	
	Carried Forward to Summary of Section No. 5		R	
	MECHANICAL INSTALLATION (PROVISIONAL) Bill No. 2 MECHANICAL INSTALLATION (PROVISIONAL)			

BILL No. 1 - PRELIMINARIES

Item no.		Unit	Quantity	Fixed	Value Related	Time Related
	SPECIAL CONDITIONS OF SUBCONTRACT AGREEMENT (SECTION C) (Refer Part C1.5)					
1	Section 01: Definitions and Abbreviations	Item				
2	Section 02: General	Item				
3	Section 03: Drawings and Submissions	Item				
4	Section 04: Work provided by Others	Item				
5	Section 05: Compliance with Standards and Regulations	Item				
6	Section 06: Safety	Item				
7	Section 07: Hoisting and Rigging	Item				
8	Section 08: Year 2000 Compliance	Item				
9	Section 09: Programming	Item				
10	Section 10: Contract Management	Item				
11	Section 11: Organization and Staff of Subcontractor	Item				
12	Section 12: Protection Against Damage	Item				
13	Section 13: Access to Equipment and Systems	Item				
14	Section 14: Cleaning and Start-up	Item				
15	Section 15: Testing, Balancing, Commissioning, Operation of Plant and Handover	Item				
16	Section 16: Guarantee	Item				
17	Section 17: Quality Management System, Testing and Inspection	Item				
18	Section 18: Operating and Maintenance Manuals	Item				
19	Section 19: One Year's Maintenance	Item				
20	Section 20: Special Attendance	Item				
21	Section 21: Preparation of Pre-Start up Checklist	Item				
22	Section 22 : Completion of Subcontract work	Item				
	Subtotals					
	TOTAL TRANSFERRED TO ITEM 1 OF THE SUMMARY OF TENDER SUMS					

REFER TO TENDER SPECIFICATIONS, PARTS C3.1, PART C3.2 AND PART C3.3

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
2	**Ducting**				
	Galvanised sheet metal ducting and fittings including supports and fixings				
2,1	**Galvanised sheet metal ducting supported in single volume space**				
2.1.1	GSM category 1 (< 750mm with semiperimeter < 1150mm)	m2	10		
2.1.2	GSM round ducting, Ø150mm	m	120		
2.1.3	GSM round ducting, Ø200mm	m	56		
2.1.4	GSM round ducting, Ø250mm	m	25		
2.1.5	GSM round ducting, Ø300mm	m	20		
	Extra over for fittings (bends, transformations, stop ends, shoes, square to rounds, take-offs, offsets)				
2,2	**Galvanised sheet metal ducting bends**				
2.2.1	GSM duct bend, Ø150mm	No	50		
2.2.2	GSM duct bend, Ø200mm	No	6		
2,3	**Galvanised sheet metal ducting transformations & offsets (Largest size)**				
2.3.1	GSM duct transformation, Ø150mm	No	7		
2.3.2	GSM duct transformation, Ø200mm	No	2		
2.3.3	GSM duct transformation, Ø250mm	No	10		
2.3.4	GSM duct transformation, Ø300mm	No	12		
2.3.5	Transition Rectangular to Round 800mm 200 x 200 - Ø150	No	3		
2.3.6	Transition Rectangular to Round 800mm 200 x 200 - Ø200	No	5		
2.3.7	Transition Rectangular to Round 800mm 300 x 300 - Ø200	No	4		
2.3.8	Transition Rectangular to Round 800mm 300 x 300 - Ø250	No	6		
2,4	**Galvanised sheet metal ducting shoe pieces**				
2.4.1	GSM duct shoe piece, category 1	No	2		
2.4.2	GSM duct shoe piece, category 2	No	2		
2,5	**Galvanised sheet metal ducting stop ends**				
2.5.1	GSM duct stop end, category 1	No	5		
2,6	**Galvanised sheet metal ducting spigots**				
2.6.1	GSM duct spigot, Ø150mm	No	32		
2.6.2	GSM duct spigot, Ø200mm	No	6		
	Flexible ducting				
2,7	**Insulated flexible ducting c/w clamps (1500 mm long)**				
2.7.1	Insulated flexible ducting, Ø150mm	No	55		
2.7.2	Insulated flexible ducting, Ø200mm	No	15		
	Dampers				
2,8	**Manual butterfly dampers c/w quadrant**				
2.8.1	Manual butterfly damper, Ø150mm,	No	3		
2.8.2	Manual butterfly damper, Ø200mm,	No	4		
2.8.3	Manual butterfly damper, Ø250mm	No	2		
2.8.4	Manual butterfly damper, Ø300mm	No	2		

	Terminals				
	Constant volume terminals				
2,9	**Extract & supply disc valves**				
2.9.1	Extract disc valve, Ø200	No	2		
2.9.2	Supply disc valve, Ø150mm	No	32		
2.9.3	Supply disc valve, Ø200mm	No	4		
2,1	**Weather louvres c/w vermin screen**				
2.10.1	Hinged weather louvre, 200mmx200mm	No	3		
2.10.2	Hinged weather louvre, 300mmx300mm	No	5		
2.10.3	Hinged weather louvre, 800mmx800mm	No	1		
	Equipment				
	Fans				
2,11	**Silent Inline Tube Fans c/w primary filter bank, sinlge phase isolator**				
2.11.1	Ø150 mm	No	5		
2.11.2	Ø200 mm	No	1		
2.11.3	Ø250 mm	No	2		
	Shutdown and Phasing Requirements				
2,12	**Shutdown and Phasing of Existing Equipment and Systems**				
	Phased installation of HVAC system, to be coordinated and agreed with the Principal Contractor				
2.12.1	Shutdown required for the removal of the domestic booster pump	No	2		
2.12.2	Shutdown required for the rerouting of domestic water piping	No	3		
2,13	**Remove, store, reinstall and recommission**				
2.13.1	Removal of AC split units and storage on site within locked and secured storage container for period of asbestos roofing eradication for that building	No	4		
2.13.2	piping	No	4		
2,14	**Budgetary Allowance**				
	"Budgetary Allowance" means a sum of money included in the Contract Sum for work intended for execution by the Contractor, the extent of which is identified but not detailed Budgetary allowances include the cost of Overheads, Preliminaries ans Profit. Work for which budgetary allowances are provided will be measured and valued in accordance with the agreement and deducted in whole or in part if not required without any compensation for loss of profit on the said allowances.				
2.14.1	Allow a budgetary allowance of R40,000.00 (Fourty Thousand) to remedy damages to existing equipment	Item	1		
	TOTAL TRANSFERRED TO ITEM 2 OF THE SUMMARY OF TENDER SUMS PART				

BILL No.3 SOIL AND WASTE

REFER TO TENDER SPECIFICATIONS, PARTS C3.1, PART C3.2 AND PART C3.3

Item	Description	Unit	Quantity	Rate	Amount
	Prices for all drainage pipes in ground are to include for necessary excavation, bedding on and surrounding with and including an approved granular material supplied and carted on to site by the contractor to a minimum thickness of 150mm below and around sides and 300mm above the pipe, backfilling, compaction and carting away excess excavated material.				
3	***SOIL& WASTE DRAINAGE***				
3,1	**SOIL, VENT and WASTE PIPES** **Equal and approved HDPE soil, waste, and ventilating pipes with plain ended pipes and fittings including ring seal and welded connections all as per the manufacturers specifications and include all expansion couplings as per manufacturers recommendation. (Geberit Sovent and supertube fittings to be used).**				
3.1.1	50mm diameter pipe fixed to wall or concrete soffits	m	2		
3.1.2	75mm diameter pipe fixed to wall or concrete soffits	m	1		
3.1.3	110mm diameter pipe fixed to wall or concrete soffits	m	3		
3.1.4	160mm diameter pipe fixed to wall or concrete soffits	m	1		
3,2	**Extra over for uPVC fittings**				
3.2.1	**Access End Caps**				
3.2.1.1	50mm access end caps	No	1		
3.2.1.2	110mm access end caps	No	1		
3.2.1.3	160mm access end caps	No	1		
3.2.2	**Reducer**				
3.2.2.1	75mm diameter reducer	No	2		
3.2.2.2	110mm diameter reducer	No	1		
3.2.2.3	160mm diameter reducer	No	2		
3.2.3	**Bends 45°**				
3.2.3.1	50mm Bend	No	2		
3.2.3.2	75mm Bend	No	2		
3.2.3.3	110mm Bend	No	4		
3.2.3.4	160mm Bend	No	2		
3.2.4	**Access Bends**				
3.2.4.1	50mm access bend	No	1		
3.2.4.2	110mm access bend	No	1		
3.2.4.3	160mm access bend	No	1		
3.2.5	**Y - Junction**				
3.2.5.1	50mm Y - Junction	No	1		
3.2.5.2	75mm Y - Junction	No	2		
3.2.5.3	110mm Y - Junction	No	1		
3.2.5.4	160mm Y- Junction	No	2		

3.2.6	**Inspection Eye Junction**				
3.2.6.1	50mm Inspection eye junction	No	1		
3.2.6.2	110mm Inspection eye junction	No	1		
3.2.6.3	160mm Inspection eye junction	No	2		
3.2.7	**Inspection Eye Reducing Junction**				
3.2.7.1	110mm Inspection eye reducing junction	No	1		
3.2.7.2	160mm Inspection eye reducing junction	No	2		
3.2.8	**Double Junction**				
3.2.8.1	110mm Double Junction (ø50-ø50 branches with ø110 main)	No	1		
3.2.8.2	160mm Double Junction	No	2		
3.2.9	**Inspection Eye Pipe**				
3.2.9.1	110mm inspection eye pipe	No	2		
3.2.9.2	160mm inspection eye pipe	No	1		
3,3	**Extra over for uPVC class 34 heavy duty pipe fittings**				
3.3.1	**Reducers**				
3.3.1.1	110mm reducer	No	4		
3.3.1.2	160mm reducer	No	1		
3.3.2	**Bends**				
3.3.2.1	110mm bend	No	2		
3.3.2.2	160mm bend	No	1		
3.3.3	**Junctions**				
3.3.3.1	110mm junction	No	4		
3.3.3.2	160mm junction	No	1		
3,4	**Cistern Overflow Drainage** **u-PVC cistern overflow drainage pipes fittings including couplings, pipe hangers, brackets and mounting plates, mounted against walls or concrete soffits.**				
3.4.1	20mm diameter fixed to wall or concrete soffits	m	15		
3,5	**Fittings and accessories**				
3.5.1	20mm diameter bend	No	10		
3.5.2	Cistern Overflow Reference Signage	No	2		
3,6	**Other Accessories and Fittings**				
3.6.1	110mm Dry Over Flow Gulley including gulley surround and round pvc gulley grate	No	1		
3.6.2	110mm Trapped Floor Drain Horizontal Discharge Stainless Steel	No	1		
3,7	**Testing**				
3.7.1	Allow for testing of the sanitary plumbing installation to the satisfaction of the principal agent and the local authorities	item	1		
3.7.2	Compaction testing of backfill to AASHTO 93% Dry Density	item			
TOTAL TRANSFERRED TO ITEM 3 OF THE SUMMARY OF TENDER SUMS					

BILL No.4 DOMESTIC AND GREY WATER (COPPER SPECIFICATION)
REFER TO TENDER SPECIFICATIONS, PARTS C3.1, PART C3.2 AND PART C3.3

Item	Description	Unit	Quantity	Rate	Amount
4	***DOMESTIC AND GREY WATER - COPPER***				
4,1	**SABS 460 Class 2 hard drawn capillary type copper tubing, including straight couplings, hangers and brackets in the running length, fixed to walls, soffits or chased into walls**				
4.1.1	15mm diameter	m	25		
4.1.2	22mm diameter	m	45		
4.1.3	28mm diameter	m	2		
4.1.4	35mm diameter	m	2		
4.1.5	42mm diameter	m	3		
4.1.6	54mm diameter	m	1		
4.1.7	67mm diameter	m	1		
4.1.8	76mm diameter	m	1		
4,2	**Extra over for hard drawn capillary type pipe fittings**				
4.2.1	**Elbows/Bend**				
4.2.1.1	15mm diameter	No	12		
4.2.1.2	22mm diameter	No	16		
4.2.1.3	28mm diameter	No	1		
4.2.1.4	35mm diameter	No	2		
4.2.1.5	42mm diameter	No	2		
4.2.1.6	54mm diameter	No	1		
4.2.1.7	67mm diameter	No	1		
4.2.1.8	76mm diameter	No	1		
4.2.2	**Tee**				
4.2.2.1	15mm diameter	No	1		
4.2.2.2	22mm diameter	No	2		
4.2.2.3	28mm diameter	No	1		
4.2.2.4	35mm diameter	No	4		
4.2.2.5	42mm diameter	No	4		
4.2.2.6	54mm diameter	No	1		
4.2.2.7	67mm diameter	No	1		
4.2.2.8	76mm diameter	No	1		
4.2.3	**Reducers**				
4.2.3.1	22mm diameter	No	2		
4.2.3.2	28mm diameter	No	2		
4.2.3.3	35mm diameter	No	1		
4.2.3.4	42mm diameter	No	2		
4.2.3.5	54mm diameter	No	1		
4.2.3.6	67mm diameter	No	2		
4.2.3.7	76mm diameter	No	1		
4.2.4	**Wall Plate Elbows**				
4.2.4.1	15mm diameter	No	2		
4.2.4.2	22mm diameter	No	2		

4,3	**Cobra 832-10 MC Angle Valve including couplings to copper pipe and sliding wall flange** (washing machine point - sanware angle valves measured elsewhere)				
4.3.1	15mm diameter	No	1		
4,4	**SANS 1065 DZR Brass, pressure control valve**				
4.4.1	15mm diameter	No			
4.4.2	25mm diameter	No	1		
4,5	**Spring type non-return valve joins to Copper, including iron couplings to copper pipe**				
4.5.1	15mm diameter	No	1		
4.5.2	20mm diameter	No	3		
4.5.3	25mm diameter	No	1		
4.5.4	32mm diameter	No	1		
4.5.5	40mm diameter	No	1		
4.5.6	50mm diameter	No	1		
4,6	**Bib Taps**				
4.6.1	20mm brass lockable bib tap mounted on standpipe cast in 500mm high Octagon shaped Concrete pedestal	No	1		
4,7	**Testing**				
4.7.1	Allow for testing of the water supply installation @ 1,5x working pressure to the satisfaction of the engineer, principal agent and the local authorities	item	1		
TOTAL TRANSFERRED TO ITEM 4 OF THE SUMMARY OF TENDER SUMS					

BILL No.5 SANITARY AND BRASSWARE

Item	Description	Unit	Quantity	Rate	Amount
5	***SANITARY AND BRASSWARE*** REFER TO TENDER SPECIFICATIONS, PARTS C3.1, PART C3.2 AND PART C3.3 ***SUPPLY AND INSTALL SANITARY FITTINGS & FIXTURES*** ***PRICE ALL ITEMS AS PER ARCHITECT'S SANWARE SCHEDULE*** ***Supply, store and fix only the following sanitary fittings. Prices are to include for fixing, cleaning, washing and leaving in a satisfactory condition at completion(incl appropriate sealing of fixtures to walls etc)*** ***All rails, brackets, etc., where not bolted are to be fixed with long heavy gauge brass screws into approved expanding plugs.*** ***SANITARY WARE***				
5.1	**Wash Hand Basins**				
5.1.1	Medical WHB	No	1		
5.1.1.1	Wash Hand Basin	No	1		
5.1.1.2	Mixer	No	1		
5.1.1.3	Basin Waste	No	1		
5.1.1.4	Bottle Trap	No	1		
TOTAL TRANSFERRED TO ITEM 5 OF THE SUMMARY OF TENDER SUMS					

BILL No. 6 EQUIPMENT

REFER TO TENDER SPECIFICATIONS, PARTS C3.1, PART C3.2 AND PART C3.3

Item	Description	Unit	Quantity	Rate	Amount
6	***EQUIPMENT***				
	Relocate the existing 100 litre horizonal Geyser and install new piping c/w valves, accessories, vacuum breaker, mounting and support as per the drawing and specification	No	1,0		
TOTAL TRANSFERRED TO ITEM 6 OF THE SUMMARY OF TENDER SUMS					

BILL No. 7 HYDRANT & HOSE REEL INSTALLATION

REFER TO TENDER SPECIFICATIONS, PARTS C3.1, PART C3.2 AND PART C3.3

Item	Description	Unit	Quantity	Rate	Amount
7	***HYDRANT & HOSEREEL INSTALLATION***				
	HYDRANT AND HOSE REEL INSTALLATION Water reticulation to be in accordance with SANS 10400 Part W Water reticulation to be in accordance with SANS 10252 12 months maintenance 12 months guarantee Attendance during commissioning Installation of supply piping, carbon steel or galvanised, including hangers, brackets, painting, rigging, hoisting etc.				
7.1	**Fire Appliances**				
7.1.1	Everyway hose reel complete with 30m plastic hose, chromium plated stopcock, shut-off nozzle and wall bracket.	No	3		
7.1.2	4,5kg Ozone friendly dry powder fire extinguisher including solid timber backing board fixed to wall.	No	7		
7.1.3	5kg Ozone friendly carbon di oxide fire extinguisher including solid timber backing board fixed to wall.	No	1		
7.1.4	80 x 65mm Brass right angle hydrant valve with cap and chain.	No	1		
7.2	**New Main Piping** **SABS - 62 black mild steel piping** Piping to be painted with 1 coat red-oxide primer and finished with 2 coats high quality gloss enamel fire engine red paint Installation of main supply piping, carbon steel, including hangers, brackets, unions and straight couplings (klambon or threaded to suit), painting, rigging, hoisting etc.				
7.2.1	ø100mm with grooved ends	m	1		
7.2.2	Ø50mm with threaded ends	m	1		
7.2.3	Ø32mm with threaded ends	m	2		
7.2.4	ø25 mm with threaded ends	m	2		
7.3	**Extra over for SABS - 62 black mild steel Fittings.** Fittings to be painted with 1 coat red-oxide primer and finished with 2 coats high quality gloss enamel fire engine red paint				
7.3.1	**90° Elbow**				
7.3.1.1	ø100 mm Klambon type	Item	1		
7.3.1.2	Ø50mm Threaded Elbow	Item	1		
7.3.1.3	ø32 mm Threaded elbow	Item	2		
7.3.1.4	ø25 mm Threaded elbow	Item	2		
7.3.2	**Reducers**				
7.3.2.1	Ø100mm	Item	2		
7.3.2.2	Ø50mm	Item	2		
7.3.2.3	Ø32mm	Item	3		
7.3.3	**Equal Tees**				
7.3.3.1	Ø100mm	Item	1		
7.3.3.2	Ø50mm	Item	1		
7.3.3.3	Ø32mm	Item	2		
7.3.3.4	Ø25mm	Item	2		
7.3.4	**Reducing Tees**				
7.3.4.1	Ø100mm	Item	1		
7.3.4.2	Ø50mm	Item	2		
7.3.4.3	Ø32mm	Item	2		
7.4	**Testing**				
7.4.1	Allow for testing of the water supply installation to the satisfaction of the engineer, principal agent and the local authorities	Item	1,00		
7.4.2	Compaction testing of backfill to AASHTO 93% Dry Density	Item			
TOTAL TRANSFERRED TO ITEM 7 OF THE SUMMARY OF TENDER SUMS					

BILL No. 8 SLEEVES

REFER TO TENDER SPECIFICATIONS, PARTS C3.1, PART C3.2 AND PART C3.3

Item	Description	Unit	Quantity	Rate	Amount
8	***SLEEVES and CORES***				
8.1	**Holes/Coring** **All cores to be fire sealed appropriatelty with grouting etc.**				
8.1.1	**Core drilling of hole for pipe not exceeding 110mm diameter:**				
	Reinforced concrete slab, beam, wall, etc. not exceeding 355mm thick.	No	2		
8.1.2	**Core drilling of hole for pipe exceeding 110 mm and not exceeding 160mm diameter:**				
	Reinforced concrete slab, beam, wall, etc. not exceeding 355mm thick.	No	2		
TOTAL TRANSFERRED TO ITEM 8 OF THE SUMMARY OF TENDER SUMS					

SUBJECT : PRIME COST AMOUNTS					Page 131
REFER TO TENDER SPECIFICATIONS, PARTS C3.1, PART C3.2 AND PART C3.3					
ITEM	**DESCRIPTION**	**UNIT**	**QTY**	**RATE**	**AMOUNT**
	"Prime Cost Amount" means an amount included in the contract sum for the delivered cost of materials and goods obtained from a Supplier as instruced by the Principal Agent. Prime Cost Amounts exclude the cost of Overheads, Preliminaries and Profit				
TOTAL TRANSFERRED TO ITEM 9 OF THE SUMMARY OF TENDER SUMS					

REFER TO TENDER SPECIFICATIONS, PARTS C3.1, PART C3.2 AND PART C3.3

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	"Budgetary Allowance" means a sum of money included in the Contract Sum for work intended for execution by the Contractor, the extent of which is identified but not detailed Budgetary allowances include the cost of Overheads, Preliminaries ans Profit.				
	Allowances for existing wet services to be rerouted/protected/replaced as a result of asbestos roofing removal *Provisional sum/allowance for fire walls in ceiling voids were requried as per fire plans.*	Item	1	R 35 000,00	R 35 000,00
		Item			R 149 550,00
TOTAL TRANSFERRED TO ITEM 10 OF THE SUMMARY OF TENDER SUMS					R 184 550,00

SUBJECT : SUMMARY OF TENDER SUMS				Page 133
ITEM	BILL No.	DESCRIPTION		AMOUNT
1		Preliminaries & General		
2		HVAC		
3		Soil & Waste Drainage		
4		Domestic Water - Copper		
5		Sanitary and Brassware		
6		Equipment		
7		Fire Services (Excl Builders Work)		
8		Sleeves		
9		Prime Cost		
10		Budgetary Allowance		R 184 550,00
TOTAL CARRIED TO PAGE 119 OF THE MAIN BOQ				

FINAL SUMMARY

Section No		Page No		Amount
1	PRELIMINARIES	21		
2	BUILDERS WORK (PROVISIONAL)	57		
3	EXTERNAL WORKS	60		
4	ELECTRICAL INSTALLATION (PROVISIONAL)	61		
5	MECHANICAL INSTALLATION (PROVISIONAL)	119		
	SUB-TOTAL		R	
	VAT @ 15%		R	
	Carried to Form of Offer		R	

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

PART C3. SCOPE OF WORKS

C3.1 SCOPE OF WORKS
GCC FOR CONSTRUCTION WORKS (Edition 2 of 2010)

Scope of Works complied in accordance with SANS 10403 where reference is made to this part of SANS 1921-1:2004

Project title:	**DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK**		
Tender no:	**ZNTM01140W**	**Project Code:**	**075988**

SECTION 1

1 EXTENT OF THE WORKS

1.1 EMPLOYERS OBJECTIVES

To eradicate asbestos from all health care centres.

1.2 OVERVIEW OF THE WORKS

Removal of existing asbestos roof covering and all other asbestos elements related to the roof.

1.3 EXTENT OF THE WORKS

BUILDINGS WITH ASBESTOS

1. Block 1
2. Block 2
3. Block 3
4. Block 4
5. Block 5
6. Block 6
7. Block 7
8. Block 8
9. Block 9
10. Block 10
11. Block 11
12. Block 12
13. Block 13
14. Block 14
15. Block 15

- Asbestos removal and safe disposal and replacement with new metal roof sheeting, timber purlin removal and replacement, ceiling removal and replacement.
- Existing gutters and rainwater down pipes removal and replacement.
- Demolishing and rebuild of non-compliant roof to block 6.

STRUCTURAL WORK

- Engineering of covered walkway roof structure.
- New metal roof tie down methodology.
- Engineering of existing footings and surface bed to Block 6.

ELECTRICAL WORK

- New lighting installation to new ceilings.
- Upgrade of existing DB Boards
- New Smoke detection
- Lightning protection

MECHANICAL WORK

- Protection, decommission, storage and recommissioning of existing HVAC units.
- Re-routing of water and drainage piping.
- Fire protection plan.

	1.4	**LOCATION OF THE WORKS** GPS Co-ordinates for the site is: 30°34'31.3026"S 29°53'23.7078"E
	1.5	**TEMPORARY WORKS** All temporary work to comply with the Occupational Health and safety Act (Act 85 of 1993).
2		**ENGINEERING**
	2.1	**EMPLOYER'S DESIGN** The Employer design and related documentation and specification is as per the Appointed Consultants.
	2.2	**DESIGN BRIEF** As per the drawings and specifications provided by the appointed Engineers and Architects.
	2.3	**DRAWINGS** See list of Drawings/Annexures attached to this document.
	2.4	**DESIGN PROCEDURES** As per the design, documentation and specification issued by the Appointed Consultants and/or the Employer.
3		**PROCUREMENT**
	3.1	**PREFERENTIAL PROCUREMENT PROCEDURES** This tender will be subject to the implementation of the Preferential Procurement Regulations, 2022, pertaining to the Preferential Procurement Policy Framework Act, Act Number 5 of 2000 and the relevant Supply Chain Management Legislation and the KwaZulu-Natal Supply Chain Management Policy Framework published by the KwaZulu-Natal Provincial Treasury. Tenderers are referred to www.kzntreasury.gov.za for access to the relevant documents. Tenderers are advised to familiarize themselves with the contents of the KwaZulu-Natal Supply Chain Management Policy Framework regarding Preference Point Systems, evaluation of tenders appeals and other matters.
	3.2	**RESOURCE STANDARD PERTAINING TO TARGETED PROCUREMENT** NOTE : This project will be adjudicated as not exceeding R 50,000 000,00
	3.3	**SCOPE OF MANDATORY SUBCONTRACT WORK** Not Applicable
	3.4	**PREFERRED SUBCONTRACTORS/SUPPLIERS** As per the conditions stated in form T2.6, in Section 1 of this document.
	3.5	**SUBCONTRACTING PROCEDURES** Not Applicable

4 CONSTRUCTION

4.1 APPLICABLE SANS 2001 STANDARDS FOR CONSTRUCTION WORKS

The Contractor is referred to the "DOH - Standard Preambles to All Trades: Revision 3 January 2009", any "Supplementary Preambles", the Electrical Specifications and Mechanical Specification for full descriptions of materials and methods referred to in these Bills of Quantities/Lump Sum documents, insofar as they apply. The Contractor is advised to study the "Standard Preambles to all Trades", any "Supplementary Preambles", the Electrical Specifications and Mechanical Specification, before pricing Bills of Quantities/Lump Sum documents.

Where the description in the Bills of Quantities/Lump Sum documents differ from those in the Standard Electrical Specifications, the descriptions in the Bills of Quantities/Lump Sum documents are to apply. No claim whatsoever will be allowed in respect of errors in pricing due to brevity of description of items in the Bills of Quantities/Lump Sum documents which are fully described when read in conjunction with the relevant Preambles and/or Specifications. Suppliers of materials and the like, whose quality systems apply with one or more of the SABS/SANS ISO 9000 Series should be used whenever possible in the absence of a particular SABS/SANS Specification Standard Mark.

Wherever the words "shall be deemed to be included in the description", "shall be stated" or other words having the same effect, appear in the Standard System, it shall be deemed that all descriptions in these Bills of Quantities/Lump Sum documents incorporated such inclusions and statements whether specifically stated or not.

The Contractor is hereby informed that where SABS/SANS Specifications are referred to in these Bills of Quantities/Lump Sums documents and Specifications thereto, then ONLY the Specification of Work Clauses will apply. The method of measurement and payment clauses will NOT apply to this Contract.

The Contractor is hereby informed that risk of collapse and keeping excavations free from water (excluding subterranean water) generally are deemed to be included in the descriptions unless accommodated in the system of measurement. Please refer to the Geotechnical Investigation report when included at the end of these tender documents.

Whenever reference is made to "Sub-Contractor", "Nominated Sub-Contractor" or the like in the specifications included or referred to in these Bills of Quantities/Lump Sums documents, it shall be deemed to mean "Contractor" as defined.

4.2 APPLICABLE NATIONAL AND INTERNATIONAL STANDARDS

See above 4.1

4.3 PARTICULAR / GENERIC SPECIFICATIONS

The Contractor is referred to the following documents whether attached to this document or not:

SPECIFICATION	PAGES
Specification for HIV/AIDS Awareness (CIDB)	HIV1 TO HIV3
Specific Construction, Safety, Health and Environmental Plan	48
DOH - Standard Preambles to All Trades: Revision 3 January 2009	102
General Electrical Specifications	E/1 to E/21
Lightning Protection Specifications	1 to 6
Fire Services Technical Specification	14
HVAC Technical Specification	33
Wet Services Specification	63
General Specifications - Replacement of Timber Purlins	1

4.4 CERTIFICATION BY RECOGNIZED BODIES

Only contractors registered with the Electrical Contracting Board of South Africa in accordance with the Regulations of the Occupational Health and Safety Act will be accepted and permitted to do work under this contract. Only contractors registered with the Department of Labour in the safe handling of asbestos products are allowed to remove and dispose of any asbestos type material and issue the associated certificates.

4.5 AGRÉMENT CERTIFICATES

Not Applicable

4.6 PLANT AND MATERIAL PROVIDED BY THE EMPLOYER

Not Applicable

4.7 SERVICES AND FACILITIES PROVIDED BY THE EMPLOYER

Not Applicable

4.8 OTHER SERVICES AND FACILITIES

The Contractor shall provide any artificial lighting which may be necessary or required for the proper execution of the works, and provide electric power and water required by all Sub-Contractors, Nominated Sub-Contractors and Sub-Contractors appointed directly by the Administration.
The Contractor shall give all notices and pay all fees in connection with temporary electrical and water connections and shall connect temporary Electrical and Water meters for and pay for all current and water consumed.
The Contractor is advised that the permanent light fittings and water points of any kind installed in the Works are not to be used to provide temporary lighting and supplement water requirements for construction purposes.

5 MANAGEMENT

5.1 APPLICABLE SANS 1921 STANDARDS

Tenderers are referred to
SECTION 2 : SPECIFICATION DATA ASSOCIATED WITH SANS 1921-1:2004 IN THIS DOCUMENT

5.2 RECORDING OF WEATHER

The Contractor shall keep record of abnormal climatic conditions to facilitate the adjudication of claims for extension of the contract period.

The Contractor shall allow in his programme for the following number of days for rain days (rain > 10mm per day) as per the table below:

CURRENT YEAR			YEAR + 1
January	w/days		3
February	w/days		3
March	w/days		3
April	w/days		3
May	w/days		3
June	w/days		3
July	w/days		3
August	w/days		3
September	w/days	3	3
October	w/days	3	3
November	w/days	3	3
December	w/days	3	3

5.3 MANAGEMENT MEETINGS

In order to facilitate the smooth functioning of the Works and to ensure the closest co-operation between all the parties concerned, the Employer will call for regular meetings every two weeks to be held on the site, at which a senior member of the Contracting firm and the General Foreman of the Works will always be required to be present.
In addition to the above, other persons will be required to attend these meetings as and when their presence is necessary, e.g., Consultants in all disciplines, representatives of the various Sub-Contractors, etc.
Proper minutes of these meetings will be kept by the Employer\Principal Agent and copies will be circulated to all persons attending the meetings and to others who need to be kept informed.

5.4 FORMS FOR CONTRACT ADMINISTRATION

The Employer shall provide all necessary forms.

5.5 ELECTRONIC PAYMENTS

The Contractor shall provide all required information to the Employer to facilitate electronic payments upon request.

5.6 DAILY RECORDS

The Contractor shall keep daily records of people and equipment employed as well as a site diary in respect of work performed on the site.
At the end of each week the Contractor shall provide the Principal Agent with a written record, in schedule form, reflecting the number and description of tradesmen and labourers employed by him and all Sub-Contractors on the works each day.
At the end of each week the Contractor shall provide the Principal Agent with a written record, in schedule form, reflecting the number, type and capacity of all plant, excluding hand tools, currently used on the works.

5.7 BONDS AND GUARANTEES

The Contractor shall within 10 calendar days after receiving notice from the Engineer and prior to receiving a completed copy of this agreement, including the schedule of deviations (if any), contact the Employer's agent (whose details are given in the contract data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the conditions of contract identified in the Contract Data.

5.8 PAYMENT CERTIFICATES

Requirements will be in accordance with the Employers prescriptions.

5.9 PERMITS

The Contractor is advised that, in the case of an existing building or institution, all security measures in force will remain in operation and he must acquaint himself and his Employees with them as he and his Employees will at all times be subject to these measures.
The Contractor will on no account extend his operations beyond the confines of the building site as indicated by the Employer and must ensure that all his Employees are made aware of these limits. Any Employee disregarding this instruction and found outside the limit of the building site without authority, shall be redeployed immediately and shall not again be employed on this Contract.
The Contractor will be responsible for ensuring that this instruction is strictly enforced and must provide and remove upon completion or when directed, such other necessary temporary barriers, fences, etc., as may be required and is to allow opposite this item for any charges he may wish to make in this connection.
The Employer will accept no responsibility whatsoever for damage to or the loss of plant, materials, etc., from the site.

5.10 PROOF OF COMPLIANCE WITH THE LAW

The following certificates must be provided before first delivery is taken:
- HIV/STI Report (Bound into this document)
- Electrical Compliance Certificate
- Plumbing Compliance Certificate
- Lightning Certificate
- Soil Protection Certificate
- Concrete test and cube certificates
- Waterproofing Guarantee certificates
- TR1 and TR2 prefabricated roof truss certificates
- Soil compaction certificates
- Electrical and Mechanical test certificates
- Plumbing and drainage pressure test certificates
- Fire Compliance Certificate
- Entomology Certificate
- SANS 10400-A:2010 compliance certificates
- Latest National Building Regulation

5.11 INSURANCE PROVIDED BY THE EMPLOYER

Not Applicable

Clause Numbers	
	SECTION 2
	SPECIFICATION DATA ASSOCIATED WITH SANS 1921-2004
4.1.7	**The requirements for drawings, information and calculations for which the Contractor is responsible are:**
	Prefabricated roof trusses design must be submitted for approval 30 days prior to erections.
4.2.1	**The responsibility strategy assigned to the Contractor for the works is:**
	Strategy A
4.2.2	**The structural engineer is:**
	Map Africa Consulting Engineers
4.2.3	**Drawings & other info are to be submitted in accordance with the contractors programme**
	N/A
4.3	**The planning, programme and method statement are to comply with the following:**
	N/A
4.12.1	**Samples of materials**
	The work is to be executed with materials of the best specification and in the most substantial and workmanlike manner under the inspection of the Employer and to his satisfaction. The Contractor shall furnish, without delay, such samples as called for or may be called for by the Employer, who may reject all materials or workmanship not corresponding with the approved sample. The samples of materials, workmanship and finishes that the Contractor is to provide and deliver to the employer are: - Tile sample. - Brick sample. - Light Fitting sample. - Roof Sheeting sample. - Gutter sample. - Door sample. - Screed panel 2m x 2m impact test. - Tested trial mix to be approved by the Engineer. - Others as per the Consultants requirements.
4.12.2	**Fabrication drawings that the contractor is to provide to the employer are:**
	Structural Steel, etc.
4.12.3	**Office accommodation, equipment, accommodation for site meetings and other facilities for use by the employer and his agents are:**
	OFFICE FOR FOREMAN
	Provide, erect, maintain and remove at completion a suitable temporary office for the Contractor or his Foreman, perfectly secured, lighted and ventilated and having a desk with drawers.
	TELEPHONE
	The Contractor shall provide a telephone on the site for the use by the Contractor and all Sub-Contractors for the duration of the Contract, and must make the necessary application for connection, give all notices and pay all fees, rentals and charges for the service and also for all calls.

	OFFICE FOR INSPECTOR OF WORKS
	Provide, erect, maintain and remove at completion a well constructed temporary office for the Inspector of Works not less than 4 x 3 m on plan and 3 m high to eaves to the approval of the Employer. The office shall be constructed of wood framing covered externally with corrugated iron and with a lean-to roof covered with the same material as the external wall covering. The office shall be lined internally with soft board or other approved material and a ceiling shall be provided of the same material as the internal lining. A suspended wood floor shall be provided and is to finish not less than 300 mm above the ground level. A lockable door and a window, which provides adequate light and ventilation, shall be fitted. An office constructed of 115 mm thick brick-work and provided with a screeded concrete floor and roofed and ceiled as above described may be accepted as an alterative but prior permission of the Employer will be necessary before construction of such an office is commenced and his requirements shall be stated and fulfilled by the Contractor. The office shall be fitted in an approved manner with a sloping topped desk of height and length suitable for the laying out and studying of drawings, a desk or table with not less than two lock-up drawers, shelves, seating and wash-stand, and the Contractor shall provide all necessary attendance.
	TELEPHONE IN OFFICE FOR INSPECTOR OF WORKS
	The Contractor shall arrange for the installation of a lockable telephone in the Office for the Inspector of Works for the duration of the Contract. The Contractor will be required to make the necessary application for connection and give all notices on behalf of the Employer. The Employer will, however, be responsible for the direct payment of all fees, rentals and other charges by Telkom for the service for the Inspector of Works and for all calls made from this telephone.
	SHED
	Provide, erect, maintain and remove at completion, ample temporary sheds for the proper storage of materials and for the use of the workmen, and remove when no longer required.
4.14.6	**The requirement for provision and erection of signboards are:**
	Supply, erect, maintain and remove at completion a painted notice board, size overall 2800 x 2345 mm high sign written to detail as Drawing No. T9506 which drawing is available from offices of the Department of Public Works. Only the official notice board is to be displayed on the site and no Sub-Contractor's boards will be permitted. The Contractor, at his own cost, may provide a board on which all sub-contract firms' names may be sign written. The notice board is to be to the approval of the Employer and is to be maintained in first class condition and placed where directed at the entrance to the site and remain there for the duration of the Contract.
4.17.1	**Requirement for the termination, diversion or maintenance of existing services:**
	Should the Contractor come in contact with any underground cables or pipes during excavations, immediate notification must be made to the Employer and all work in the vicinity of such cables, pipes, etc., shall cease until authority to proceed has been obtained from the Employer. Should the Contractor damage underground cables or pipes resulting in a disruption of services to an existing institution such damage shall be repaired immediately.
4.17.3	**Services which are known to exist on the site:**
	Contractor to prove services.
4.17.4	**Requirement for detection apparatus**
	None

4.18	**ADDITIONAL HEALTH AND SAFETY REQUIREMENTS ARE:**
	By the submission of a tender, any Tenderer will, if awarded the contract to which this tender document relates, be deemed to be the mandatory as envisaged by Section 37 (2) of the Act. As a mandatory the successful Tenderer will be deemed to be the "principal contractor" and an employer in his/her/their own right with duties as prescribed in the Act and accordingly will be deemed to have agreed to be solely responsible for ensuring that in connection with the service to which this tender document relates, all work will be performed and machinery and plant used in accordance with the Act. Should the Contractor, for whatever reason be unable to perform as required by the Act, the Contractor undertakes to inform the Employer accordingly. Tenderers are advised that it is a Condition of this Tender that a 'Construction Phase Safety, Health and Environmental Plan' specifically relates to the project for which tenders are being submitted and must be prepared by the Tenderer and submitted with the other tender documents at the time of tender. Failure to do so will invalidate the tender. Tenderers are therefore advised to study the 'Construction Safety, Health and Environmental Specification' which is issued as part of this tender document, the DOH - Standard Preambles to All Trades: Revision 3 January 2009, any project Specification included in this tender document and any and all drawings which are referred to and issued as part of this tender document before preparing their own project specific 'Construction Phase Safety, Health and Environmental Plan' . Tenderers are also advised that such a plan which is submitted with a tender but is incomplete or considered inadequate by the Employer or his Representative will invalidate the tender. The Contractor will be deemed to have satisfied himself with his obligations in terms of the Act and to have allowed for all costs arising from compliance with the Act as no claim for extra costs arising from compliance with, and obligations in terms of the Act will be entertained.
4.22	**WORK BY NOMINATED AND SELECTED SUBCONTRACTORS COMPRISE:**
	As per the Bill of Quantities and Scope of Works.

C3.2 - SPECIFICATION FOR HIV/AIDS AWARENESS

1 Scope

This generic specification contains requirements applicable to the reduction of the risk of transfer of the HIV virus between and among construction workers and the local community through the following four strategies:

a) raising awareness about HIV/AIDS;

b) providing construction workers with access to condoms;

c) HIV counselling, testing and referral services; and

d) Sexually Transmitted Infection diagnosis and treatment.

2 Normative references:

The following standard contains provisions that, through reference in this text, constitute provisions of this standard:

SANS 4074 ISO 4074, *Condom Rubbers*

3 Definitions and Abbreviations

3.1 Definitions

Construction Worker: all persons in the employ of the contractor or in the employ of any of the subcontractors contracted by the contractor.

Local Community: the communities local to the site which are most likely to have contact with the construction worker and, in particular, sex workers in those communities.

Service provider: the natural or juristic person recognised by the South African Department of Health as specialist in conducting Aids Awareness Programmes.

3.2 Abbreviations

STI: Sexually transmitted infection

HIV: Human Immunodeficiency Virus

AIDS: Acquired Immune Deficiency Syndrome

4 Objectives

The objectives are to:

a) reduce the risk of transfer of the HIV virus between and among construction workers and the local community;

b) raise awareness amongst construction workers and the local community of the risk of infection with the HIV virus;

c) promote early diagnosis; and

d) assist affected individuals to access care and counselling.

5 Requirements

5.1 General requirement

The contractor shall, in order to satisfy the objectives stated in 4:

a) make condoms complying with the requirements of SABS ISO 4074 available to all construction workers at readily accessible points on the site, suitably protected from the elements, for the duration of the contract;

b) either place and maintain HIV/AIDS awareness posters of size of not less than A1 in areas which are highly trafficked by construction workers, or provide construction workers with a pamphlet, in languages largely understood by construction workers, which

c) encourage voluntary HIV/STI testing;

d) provide information concerning counselling, support and care of those that are infected services; and

e) comply with the requirements of 5.2.

***The* provisions *of* 5.1 c) *and d) do not apply to* this contract.**

5.2 HIV awareness programme

5.2.1 The contractor shall:

a) engage a qualified service provider as described in the scope of works to conduct an HIV Awareness Programme which is structured to achieve the outcomes stated in 5.2.3 for contract workers as soon as a construction workers camp is established and populated or, where no such camp is established, within two weeks of the commencement of a significant portion of the works and at subsequent intervals, if any, provided for in the scope of works; and

b) arrange for, provide a suitable venue, and instruct all construction workers to attend the HIV Awareness Programme and notify the Employer's Representative of the date, time and venue whenever a session with construction workers is conducted.

Note: The National Department of Public Works maintains a list of qualified service providers.

5.2.2 The contractor shall do nothing to dissuade construction workers from attending such an HIV Awareness Programme and shall take all reasonable steps to ensure that a minimum of 90% of construction workers engaged in the works attend such a programme, when it is conducted.

5.2.3 The outcomes of the HIV Awareness Programme shall as a minimum, result in contract workers exposed to such a programme being able to:

a) communicate the existence of problems of HIV and be able to outline the consequences of transmission of HIV to or from the local community;

b) recall and communicate the mode of HIV transmission and preventative measures including the proper use of the condom.

The HIV/ Aids awareness programme described in 5.2 is to be repeated at four month intervals throughout the duration of the contract. (Four times in total, including the initial one at the start of the contract)

5.3 Reporting

5.3.1 The contractor shall prepare and attach to his claims for payment a brief report which outlines how the actions taken by the contractor in the period for which payment is claimed satisfy the requirements and a schedule which lists the names, identity numbers, trade / occupation and name of employer of all construction workers exposed to the programme (see **HIV/STI Compliance Report**).

5.3.2 The employer's representative shall certify the report and schedule described in 5.3.1 whenever a claim for payment is issued to the employer.

Note: In the event that the contractor fails to satisfy the requirements of this specification, the employer (Head: Public Works) may apply any of the sanctions provided for in the contract. Sanctions may include the application of a financial penalty of .04% of the Contract Sum.

The *HIV /Aids* awareness programme *described* in 5.2 shall in addition *be conducted* for the benefit *of* the local community on two occasions in the community centre nearest to the building site. The contractor shall be *responsible* for inviting identifiable community-based *institutions and organisations, churches, and schools to participate in the* programme.

C3.3 - HIV/STI COMPLIANCE REPORT

Pro-forma reporting format in terms of the SPECIFICATION FOR HIV/AIDS AWARENESS

Project Code:	075988		
Payment Claim number:		Period covered by payment claim:	

1. Distribution of condoms (briefly describe where and how condoms are distributed).

2. Posters / pamphlets (briefly describe where posters were placed / how pamphlets were distributed).

3. Voluntary testing (briefly describe the actions taken / information provided to promote testing).

4. Counselling, support and care (summarise information provided).

5. HIV awareness programme (briefly describe action).

6. Schedule of construction workers exposed to the HIV awareness programme.

Name	Identity number	Trade / occupation	Name of employer

I hereby declare the above to be a true reflection of actions taken to ensure compliance with the specification.

For Contractor:

Name: _____

Signature: _____

Date: _____

Employer's representative:

Name: _____

Signature: _____

Date: _____

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

PART C4. SITE INFORMATION

C4.1 SITE INFORMATION
GCC FOR CONSTRUCTION WORKS (2 Edition of 2010)

Project title:	**DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK**		
Tender No.	**ZNTM01140W**	**Project Code:**	**075988**

C4.1 Site Information

C4.1 GENERAL

(a) Certain areas of the site will be operational during construction stage of the project. A detailed programme of the works will be required from the successfull Tenderer outlining sequesence of activities.

(b) Contractor is to provide his own water and electricity for the construction works and only by arrangement with Management can he use the facilities water and electricity.

(c) The site is located in the Ugu District Municipal. GPS Co-ordinates for the site is: 30°34'31.3026"S 29°53'23.7078"E

C4.2 GEOTECHNICAL INVESTIGATION REPORT

(a) Not Applicable

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

PART C5 - DRAWINGS / ANNEXURES

C5.1 - LIST OF DRAWINGS/ANNEXURES

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

Tender No.:	ZNTM01140W	Project Code:	075988

(Where drawings/annexures are issued, document compilers must insert the following paragraph and list the applicable drawings/annexures below.)

The following drawings/annexures shall be issued during the Tender period to form part of the tender documentation. Where applicable, drawings/annexures could be re-issued to the Contractor at commencement of the construction phase.

DRAWING NO	DESCRIPTION
	ARCHITECTS DRAWINGS
WD-100 - 7	Section and Elevations
WD-100-1,11 & 13	St Andrews-Ext.Walkways
WD-100-2 & 12	St Andrews-Water pump & Lab Walkway
WD-100-3	St Andrews-Occupation therapy
WD-100-4	St Andrews-Workshops
WD-100-5	St Andrews-Laundry-Ground Floor Plan
WD-100-6	St Andrews-Doctor's House
WD-100-8	St Andrews-Mortuary building
WD-100-9 & 10	St Andrews-Crisis centre & Womans Health Floor and Roof Plan
WD-100-14	St Andrews-Tuckshop-Roof plan, floor plan, section and elevations
WD-101 - 7	St Andrews - Occupational Health and Audiometry - Ceiling Plan
WD-101-5	St Andrews-Laundry-First Floor Plan
WD-102-5	St Andrews-Laundry - Roof Plan
WD-103-5	St Andrews-Laundry-Ceiling Plan
WD-200-5	St Andrews-Laundry-Elevations & Sections
WD-200-9 & 10	St Andrews-Crisis centre & Womans Health Section & Elevations
	STRUCTURAL ENGINEERS DRAWINGS
545-301-P3	Walkways
545-302-P3	Occupational Health and Audiometry Foundations
545-Sk01	General Specifications-Replacement of Timber Purlins
	MECHANICAL ENGINEERS DRAWINGS
211043-F-FP-002_rev0	Occ Health-Audiometry Fire Protection Layout
211043-F-FP-003_rev0	Doctor's House Fire Protection Layout
211043-F-FP-004_rev0	Laundry Ground Floor Fire Protection Layout
211043-F-FP-005_rev0	Laundry First Floor Fire Protection Layout
211043-F-FP-006_rev0	Mortuary building Fire Protection Layout
211043-F-FP-007_rev0	Crisis Centre & Womans Health Floor and Room Fire Protection Layout
211043-F-FP-008_rev0	Occupation therapy Fire Protection Layout
211043-F-FP-009_rev0	Tuckshop & Pumproom Fire Protection Layout
211043-F-FP-010_rev0	Workshops Fire Protection Layout
211043-M-WS-003_rev0	Doctor's House

ELECTRICAL ENGINEERS DRAWINGS	
22015_100_0	Lighting layouts
22015_200_0	Small power layouts
22015_300_0	Smoke detection layouts
22015_401_0	Single line diagram: DB-A
22015_402_0	Single line diagram: DB-C
22015_403_0	Single line diagram: DB-D
22015_404_0	Single line diagram: DB-L1
22015_405_0	Single line diagram: DB-L2
22015_406_0	Single line diagram: DB-M
22015_407_0	Single line diagram: DB-OT
22015_408_0	Single line diagram: DB-T
22015_409_0	Single line diagram: Typical Distribution board for DB: W1 - W5
22015_600_0	Luminaire Schedule
22015_900_0	Lightning protection Layouts

ANNEXURES	
Annexure 1	DOH - Standard Preambles to All Trades: Revision 3 January 2009
Annexure 2	General Electrical Specifications
Annexure 3	Lightning Protection Specifications
Annexure 4	Map of Tender submission location
Annexure 5	Joint Venture Agreement
Annexure 6	Project Specific Health and Safety Specification
Annexure 7	Health and Safety Bill of Quantities
Annexure 8	Builders Lien Agreement
Annexure 9	Geotechnical Investigation Report - (Not Applicable)
Annexure 10	Additional Specification - EPWP
Annexure 11	EPWP BOQ
Annexure 12	Scope of Works in Respect of Work Relating to EPWP
Annexure 13	EPWP Employment Contract and EPWP Specification/Checklist
Annexure 14	Attendance Register - Infrastructure and Other projects
Annexure 15	EPWP Data Collection tool for Phase 3 system
Annexure 16	Fire Services Technical Specification
Annexure 17	HVAC Technical Specification
Annexure 18	Wet Services Specification
Annexure 19	General Specifications - Replacement of Timber Purlins

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

TENDER DRAWINGS

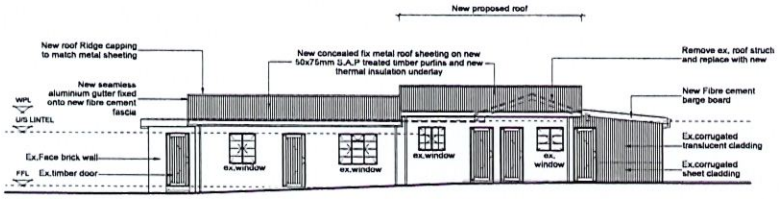
KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

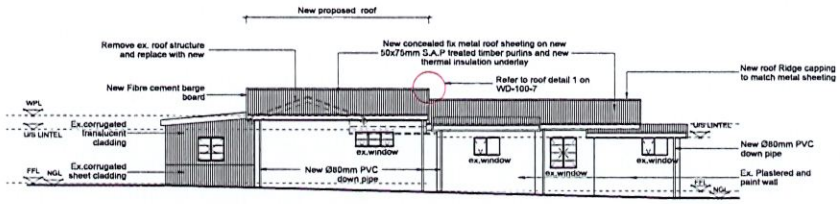
ANNEXURES

EXISTING ASBESTOS ROOF SHEETING

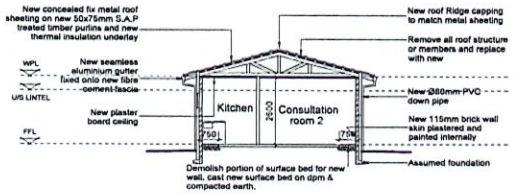
Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



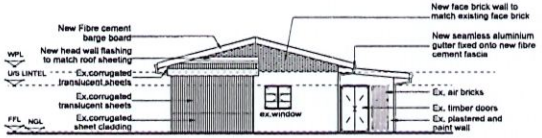
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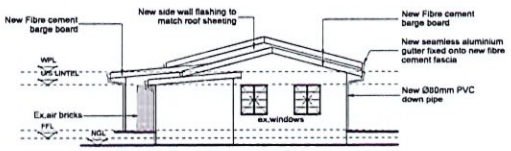
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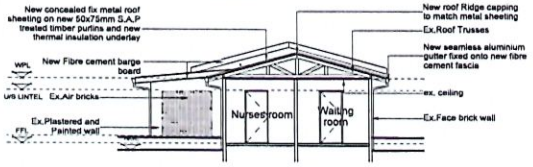
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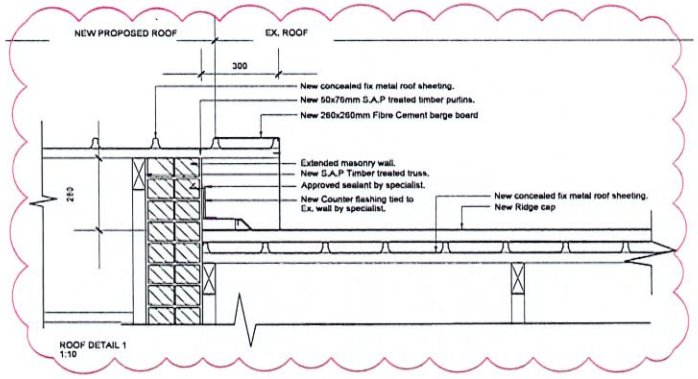
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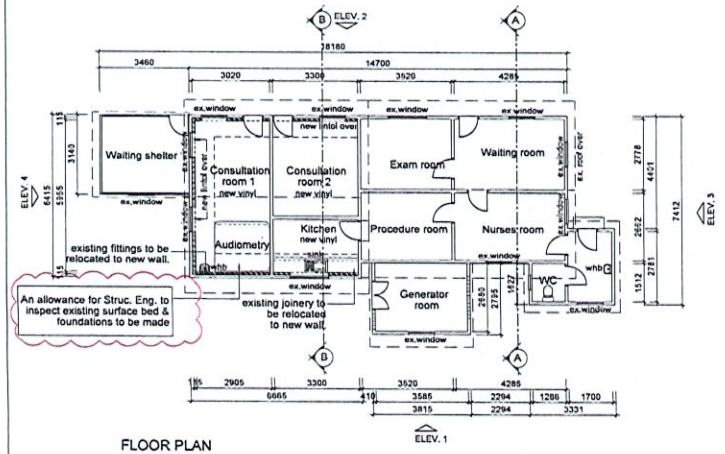
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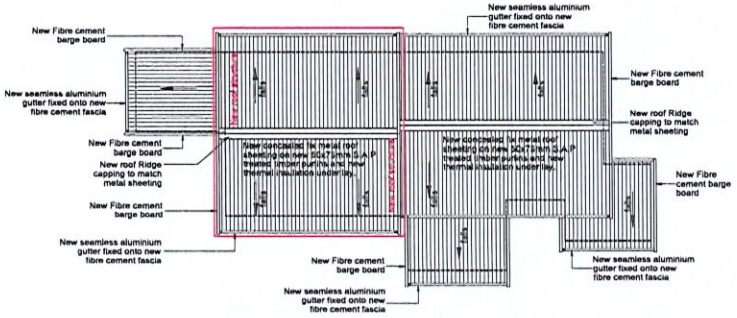
SECTION A A
SCALE 1:100



ROOF DETAIL 1
1:10



FLOOR PLAN
SCALE 1:100
AREA=464 msq



ROOF PLAN
SCALE 1:100

ROOF SPECIFICATION

RC Waterproofing

Strip existing waterproofing, install screed to fall and lay one-layer Derbigum SP4 waterproofing membrane with 75mm side and 100mm end laps. Sealed to primed surface to falls and cross falls by "torch-fusion" finished with two coats of bituminous aluminium paint. Waterproofing is to be installed by an approved Derbigum contractor under a ten year guarantee

Roof Sheeting

Double-interlocking concealed-fix Klip-Tile™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.58mm Z275 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waferhead screws type 17 to timber purlins.

- Poly closures to be to manufacturers recommendations.

Insulation

Alucool A1 Non-Combustible 135mm Foil Faced Glass Mineral wool as manufactured by Africa Thermal Insulations, use in-conjunction with White PVC Coated Wire placed @ 275mm apart and 48mm DS Tape. Installed as per manufacturers Guidelines.

Roof Flashing

Flashings specifications shall be to the Global Roofing Solutions standards and fixed to the sheeting with S10 brackets or, Sliding brackets at apex where roof sheets are 30m or longer, to obviate any direct fixing perforations. Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet in order to prevent any penetration of wind driven water. The trough shall be lipped at the eaves end to form a drip. Transverse flashing flanges shall be notched to the sheet profile where necessary. All these operations must be performed with special tools available from Global Roofing Solutions. Positive fix on eaves with minimum two screws per sheet as supplied by manufacturer.

Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 500mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

General Note

Every precaution shall be taken to prevent damage to roof sheets during all stages of construction. Duck boards should be used when necessary to protect the sheeting from damage. Sheeting which has become deformed or damaged in any way, should be replaced. Care shall be taken to ensure that no sheeting or flashing will be cut with abrasive disc on roof surfaces in order to prevent steel particles from penetrating coated surfaces.

The contractor shall exercise special care when handling long length sheeting, particularly in windy conditions. Should work be interrupted for any reason, all loose sheeting and incomplete sections must be adequately secured against possible movement by wind and gravity.

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- CONTRACTOR TO CHECK ALL QUANTITIES PRIOR TO ORDERING AND MANUFACTURE.
- CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL BY ARCHITECT PRIOR TO MANUFACTURE.

Revision:

No.:	Date:	Description:	Init.
A	2023.06.01	Engineering investigation note added on Floor Plan	KLN
B	2023.07.28	1 in 10 detail added and roof fixing note added.	KOT

Client:

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date:	Drawn:	Scale:
2023.01.19	BN	A1 on A1

Drawing Description:

OCCUPATIONAL HEALTH & AUDIOMETRY : FLOOR PLAN, ROOF PLAN, SECTION AND ELEVATIONS

Job no.:	Drawing no.:	Rev. no.:
s558	WD-100-7	B

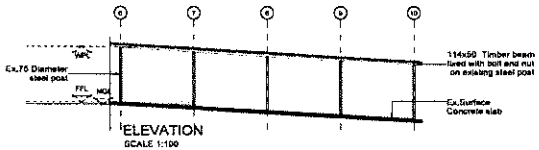
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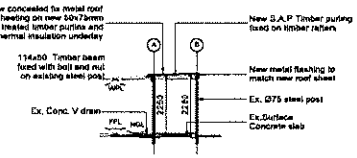
ISSUED FOR APPROVAL	
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EXISTING ASBESTOS ROOF SHEETING

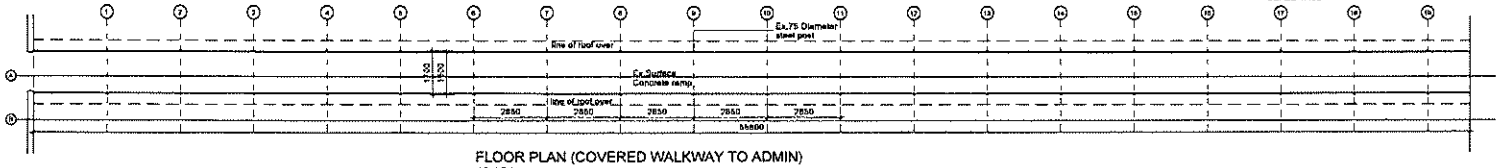
Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



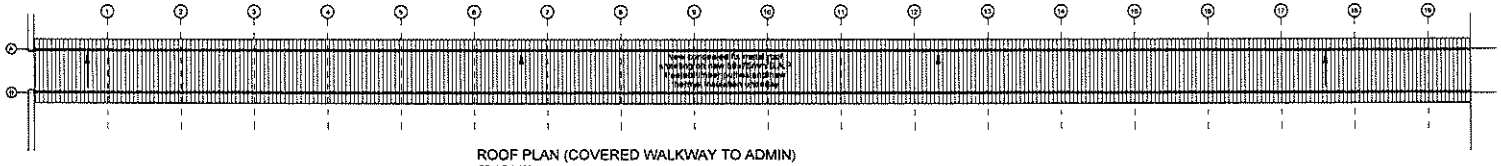
ELEVATION
SCALE 1:100



SECTION A A
SCALE 1:100



FLOOR PLAN (COVERED WALKWAY TO ADMIN)
SCALE 1:100
AREA=140 msq



ROOF PLAN (COVERED WALKWAY TO ADMIN)
SCALE 1:100

ROOF SPECIFICATION

RC Waterproofing

Strip existing waterproofing, install screed to fall and lay one-layer Derbigum SP4 waterproofing membrane with 75mm side and 100mm end laps. Sealed to primed surface to falls and cross falls by "torch-fusion" finished with two coats of bituminous aluminium paint. Waterproofing is to be installed by an approved Derbigum contractor under a ten year guarantee

Roof Sheeting

Double-interlocking concealed-fix Klip-Tite™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.58mm Z275 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waterhead screws type 17 to timber purlins.

* Poly closures to be to manufacturers recommendations.

Insulation

Alucool A1 Non-Combustible 135mm Foil Faced Glass Mineral wool as manufactured by Africa Thermal Insulations, use in-conjunction with White PVC Coated Wire placed @ 375mm apart and 48mm DS Tape. Installed as per manufacturers Guidelines.

Roof Flashing

Flashings specifications shall be to the Global Roofing Solutions standards and fixed to the sheeting with S10 brackets or, Sliding brackets at apex where roof sheets are 30m or longer, to obviate any direct fixing perforations. Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet in order to prevent any penetration of wind driven water. The trough shall be tipped at the eaves end to form a drip. Transverse flashing flanges shall be notched to the sheet profile where necessary. All these operations must be performed with special tools available from Global Roofing Solutions. Positive fix on eaves with minimum two screws per sheet as supplied by manufacturer.

Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 500mm centres.

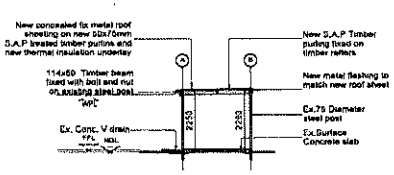
Remove existing downpipes and replace with new white 100 x 75mm Bated aluminium rainwater downpipes and baked enamel finish

GENERAL DRAWING NOTES

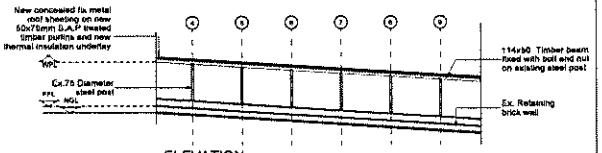
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Revision:

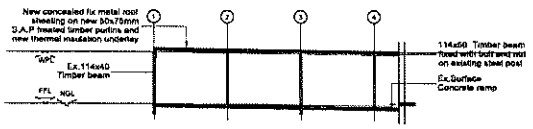
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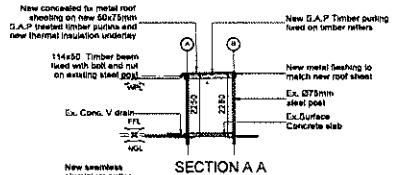
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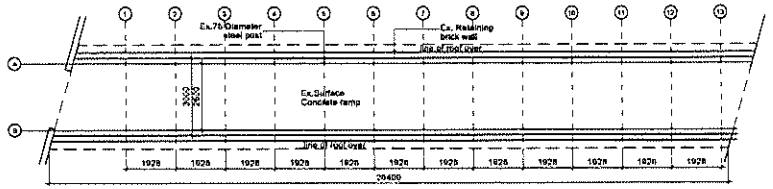
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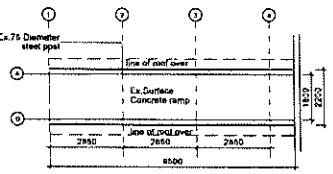
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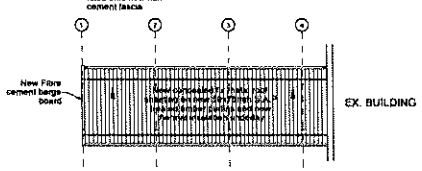
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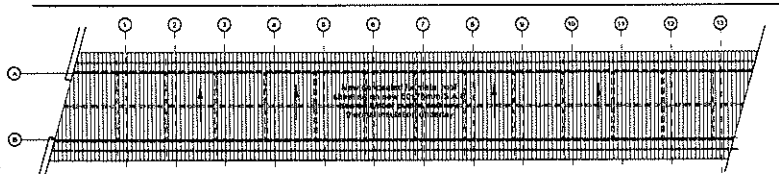
FLOOR PLAN (BLOCK 13
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AREA=112 msq



FLOOR PLAN (BLOCK 11)
SCALE 1:100
AREA =28 msq



ROOF PLAN (BLOCK 11)
SCALE 1:100



ROOF PLAN (BLOCK 13)
SCALE 1:100

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: SN	Scale: A1 on A1

Drawing Description:

COVERED WALKWAY: FLOOR PLAN, ROOF PLAN, SECTION AND ELEVATIONS

Job no.:	Drawing no.:	Rev. no.:
s558	WD-100-1,11 & 13	

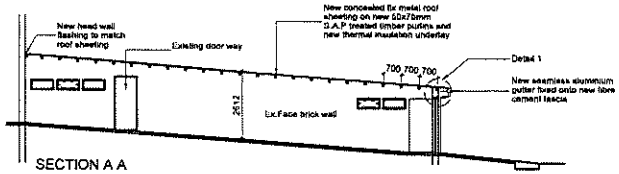
SAKHISIZWE ARCHITECTS

Signature: Date:

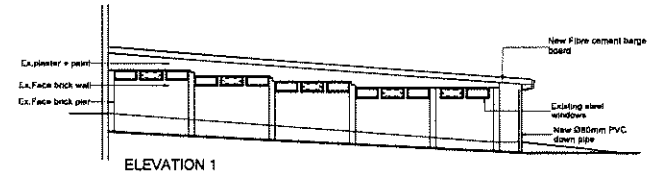
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EXISTING ASBESTOS ROOF SHEETING

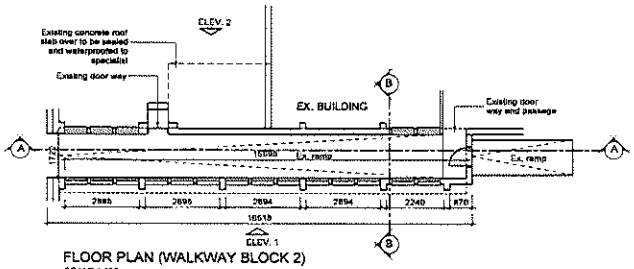
Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



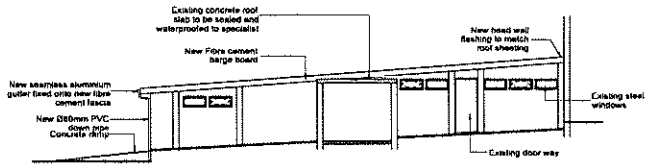
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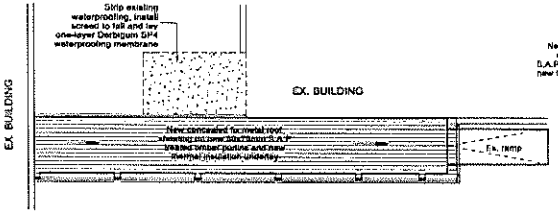
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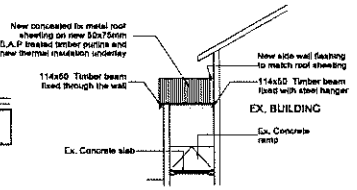
FLOOR PLAN (WALKWAY BLOCK 2)
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AREA =47 msq



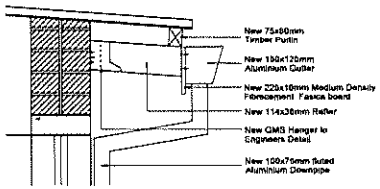
ELEVATION 2
SCALE 1:100



ROOF PLAN (WALKWAY BLOCK 2)
SCALE 1:100



SECTION B B
SCALE 1:100



DETAIL 1 - GUTTER FIXING
SCALE 1:10

ROOF SPECIFICATION

RC Waterproofing

Strip existing waterproofing, install screed to fall and lay one-layer Derbigum SP4 waterproofing membrane with 75mm side and 100mm end laps. Sealed to primed surface to falls and cross falls by "torch-fusion" finished with two coats of bituminous aluminium paint. Waterproofing is to be installed by an approved Derbigum contractor under a ten year guarantee

Roof Sheeting

Double-interlocking concealed-fix Klip-Tile™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.58mm Z275 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waferhead screws type 17 to timber purlins.

* Poly closures to be to manufacturers recommendations.

Insulation

Alucool A1 Non-Combustible 135mm Foil Faced Glass Mineral wool as manufactured by Africa Thermal Insulations, use in-conjunction with White PVC Coated Wire placed @ 275mm apart and 48mm DS Tape. Installed as per manufacturers Guidelines.

Roof Flashing

Flashings specifications shall be to the Global Roofing Solutions standards and fixed to the sheeting with S10 brackets or, Sliding brackets at apex where roof sheets are 30m or longer, to obviate any direct fixing perforations. Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet in order to prevent any penetration of wind driven water. The trough shall be lipped at the eaves end to form a drip. Transverse flashing flanges shall be notched to the sheet profile where necessary. All these operations must be performed with special tools available from Global Roofing Solutions. Positive fix on eaves with minimum two screws per sheet as supplied by manufacturer.

Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 500mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

General Note

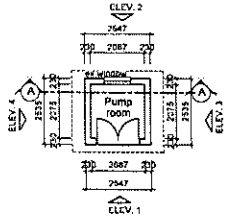
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The contractor shall exercise special care when handling long length sheeting, particularly in windy conditions. Should work be interrupted for any reason, all loose sheeting and incomplete sections must be adequately secured against possible movement by wind and gravity.

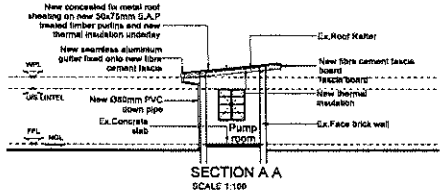
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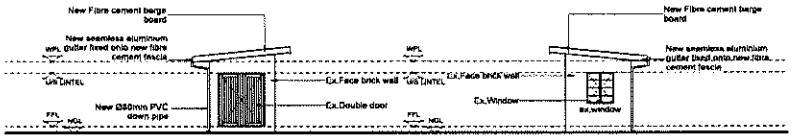
Revision:			
No.:	Date:	Description:	Init.



FLOOR PLAN (WATER PUMP)
SCALE 1:100
AREA=9 msq

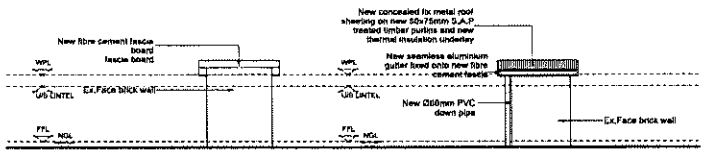


SECTION A A
SCALE 1:100



ELEVATION 1
SCALE 1:100

ELEVATION 2
SCALE 1:100



ELEVATION 3
SCALE 1:100

ELEVATION 4
SCALE 1:100

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: BN	Scale: AS on A1

Drawing Description:

WATER PUMP HOUSE & LAB WALKWAY: FLOOR PLAN, ROOF PLAN, SECTION AND ELEVATIONS

Job no.:	Drawing no.:	Rev. no.:
s558	WD-100-2 & 12	

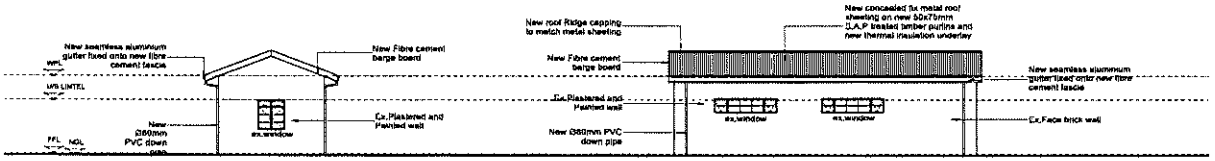
SAKHISIZWE ARCHITECTS

Signature: Date:

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ISSUED FOR SUBMISSION	
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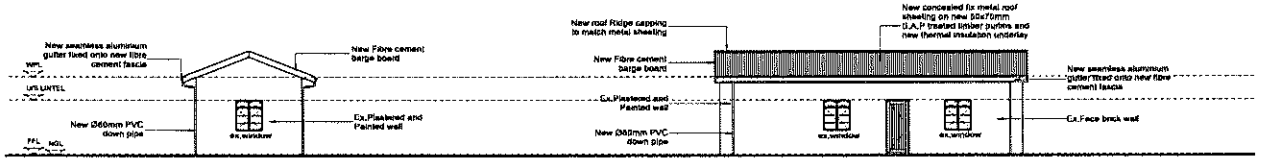
EXISTING ASBESTOS ROOF SHEETING

Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



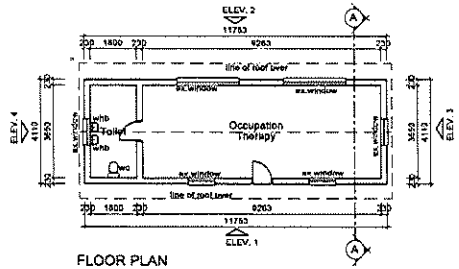
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ELEVATION 2
SCALE 1:100

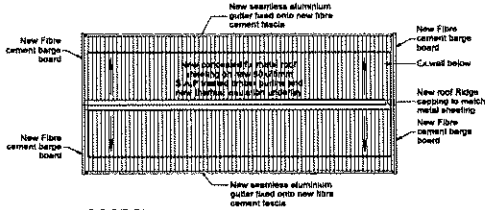


ELEVATION 3
SCALE 1:100

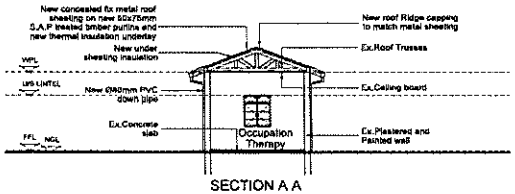
ELEVATION 1
SCALE 1:100



FLOOR PLAN
SCALE 1:100
AREA = 46 msq



ROOF PLAN
SCALE 1:100



SECTION A A
SCALE 1:100

Roof Sheeting

Double-interlocking concealed-fix Klip-Tite™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.55mm Z276 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waterhead screws type 17 to timber purlins.

* Poly closures to be to manufacturers recommendations.

Insulation

Alucool A1 Non-Combustible 135mm Foil Faced Glass Mineral wool as manufactured by Africa Thermal Insulations, use in-conjunction with White PVC Coated Wire placed @ 275mm apart and 48mm DS Tape. Installed as per manufacturers Guidelines.

Roof Flashing

Flashings specifications shall be to the Global Roofing Solutions standards and fixed to the sheeting with S10 brackets or, Sliding brackets at apex where roof sheets are 30m or longer, to obviate any direct fixing perforations. Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet in order to prevent any penetration of wind driven water. The trough shall be lipped at the eaves end to form a drip. Transverse flashing flanges shall be notched to the sheet profile where necessary. All these operations must be performed with special tools available from Global Roofing Solutions. Positive fix on eaves with minimum two screws per sheet as supplied by manufacturer.

Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.8mm Aluminium profiled gutter with brackets fixed at 500mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

General Note

Every precaution shall be taken to prevent damage to roof sheets during all stages of construction. Duck boards should be used when necessary to protect the sheeting from damage. Sheeting which has become deformed or damaged in any way, should be replaced. Care shall be taken to ensure that no sheeting or flashing will be cut with abrasive disc on roof surfaces in order to prevent steel particles from penetrating coated surfaces.

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Revision:

No.:	Date:	Description:	Init.

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: BN	Scale: As on A1

Drawing Description:

OCCUPATIONAL THERAPY: FLOOR PLAN, ROOF PLAN, SECTION AND ELEVATIONS

Job no.:	Drawing no.:	Rev. no.:
s558	WD-100-3	

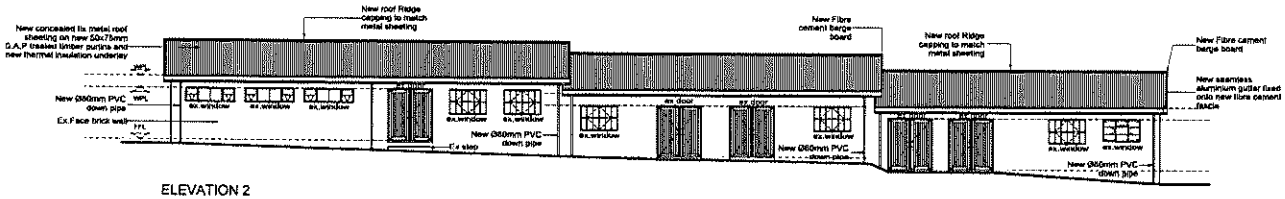
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Signature: Date:

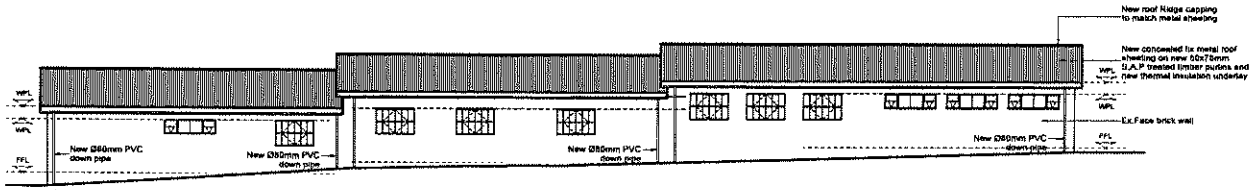
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ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	

EXISTING ASBESTOS ROOF SHEETING

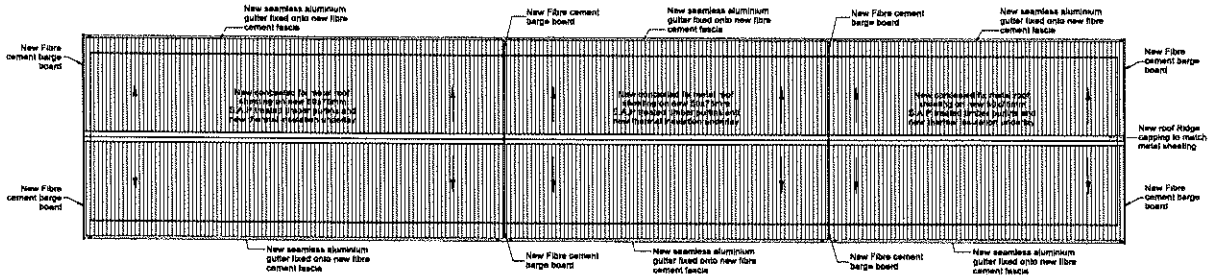
Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



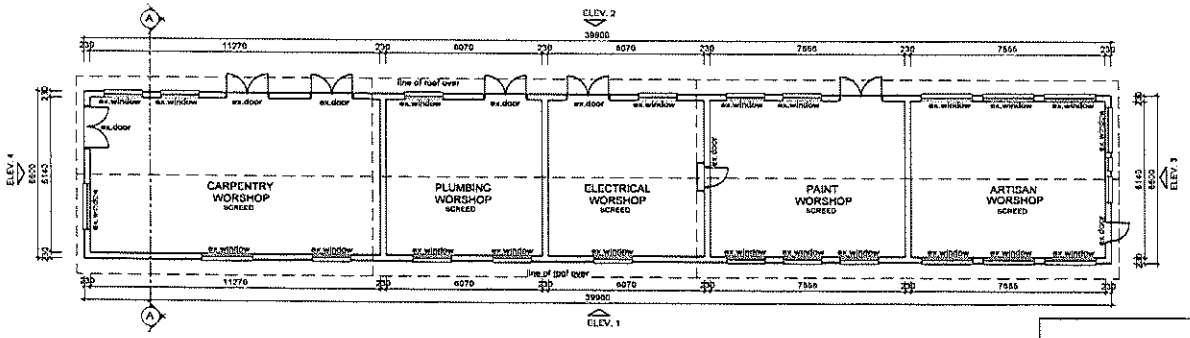
ELEVATION 2
SCALE 1:100



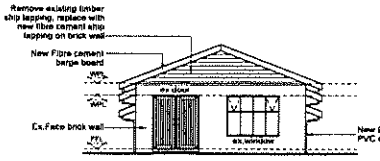
ELEVATION 1
SCALE 1:100



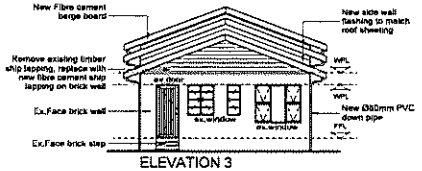
ROOF PLAN
SCALE 1:100



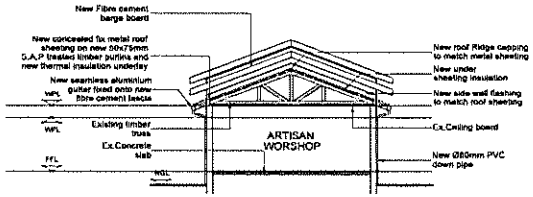
FLOOR PLAN
SCALE 1:100
AREA = 268 msq



ELEVATION 4
SCALE 1:100



ELEVATION 3
SCALE 1:100



SECTION A A
SCALE 1:100

Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 600mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

General Note

Every precaution shall be taken to prevent damage to roof sheets during all stages of construction. Duck boards should be used when necessary to protect the sheeting from damage. Sheeting which has become deformed or damaged in any way, should be replaced. Care shall be taken to ensure that no sheeting or flashing will be cut with abrasive disc on roof surfaces in order to prevent steel particles from penetrating coated surfaces.

Roof Sheeting

Double-interlocking concealed-fix Klip-Tile™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.58mm Z275 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having apurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waferhead screws type 17 to timber purlins.

- Poly closures to be to manufacturers recommendations.

Insulation

Alucool A3 Non-Combustible 135mm Foil Faced Glass Mineral wool as manufactured by Africa Thermal Insulations, use in-conjunction with White PVC Coated Wire placed @ 275mm apart and 48mm DS Tape. Installed as per manufacturers Guidelines.

Roof Flashing

Flashings specifications shall be to the Global Roofing Solutions standards and fixed to the sheeting with S10 brackets or, Sliding brackets at apex where roof sheets are 30m or longer, to obviate any direct fixing perforations. Prior to flashings being fixed, all troughs at the apex shall be step-ended to the full depth of the sheet in order to prevent any penetration of wind driven water. The trough shall be lipped at the eaves end to form a drip. Transverse flashing flanges shall be notched to the sheet profile where necessary. All these operations must be performed with special tools available from Global Roofing Solutions. Positive fix on eaves with minimum two screws per sheet as supplied by manufacturer.

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Revision:

No.	Date	Description	Init

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2022.01.18	Drawn: SN	Scale: AJ on A1

Drawing Description:

WORKSHOP: FLOOR PLAN, ROOF PLAN, SECTION AND ELEVATIONS

Job no.: s658	Drawing no.: WD-100-4	Rev. no.:

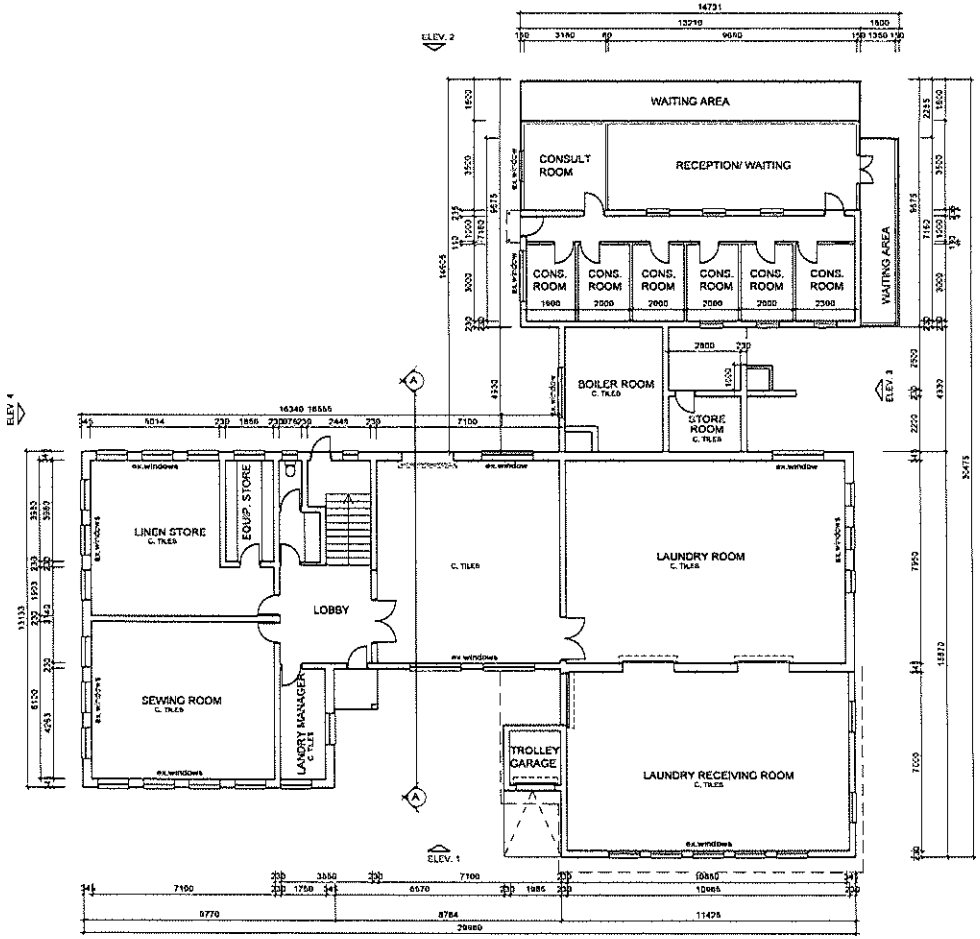
SAKHISIZWE ARCHITECTS

Signature: Date:

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ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	

EXISTING ASBESTOS ROOF SHEETING

Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



GROUND FLOOR PLAN
SCALE 1:100
AREA=345 msq

CEILING SPECIFICATION

Gyproc plaster Board Ceiling

9mm Gyproc Plasterboard Fixed with Drywall Screws at 150mm Centres to 38x50mm SAP brandering, Joints to be Covered with 50mm Wide Self Adhesive Glass Fibre Tape & Finished with Jointing Tape, Skimmed with Single Coat Rhinolite, Sanded Smooth, Rubbed Down, Brushed & Prepared to remove all Contaminants in Preparation to Receive 1x plascon primer, 1x coat plascon under coat and 2x coats of plascon velvaglo , Application & Fixing as per Manufacturers Specification.

Moisture resistant plaster board

Fit 12mm Moisture resistant plaster board on manufacture approval suspended grid system with tapered edge of board facing down with 25mm drywall screws at 150mm centres.Apply 50mm Jumbo tape to all joints and finish the entire ceiling with 3-5mm Jumbo skimming. Ceiling perimeter to be finished with prepared shadow line trim prepare substrate ensure that the surface is clean,dry,sound and free of defect .Apply 1 coat professional Gypsum & plastor prime ,allow to dry for minimum 1Ghrs.Apply 2 full coats of plascon Hygiene low sheen allow 2hrs drying time between coats.

CORNICE
coved plasterboard cornice, painted to match ceiling.

Roof Sheeting

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Revision:

No.:	Date:	Description:	Int.

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: SN	Scale: A1 on A1

Drawing Description:

LAUNDRY: GROUND FLOOR PLAN

Job no.	Drawing no.	Rev. no.
s558	WD-100-S	

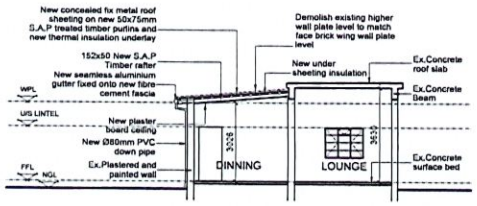
SAKHISIZWE A ARCHITECTS

Signature: Date:

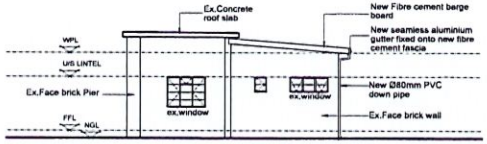
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ISSUED FOR INFORMATION	
ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	

EXISTING ASBESTOS ROOF SHEETING

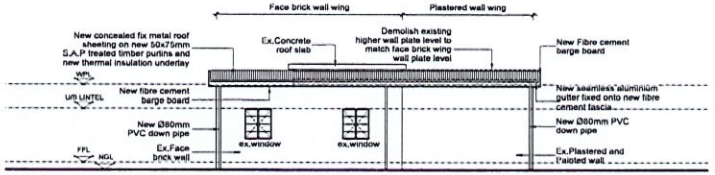
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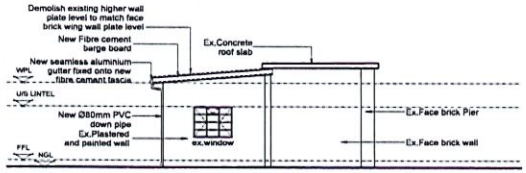
SECTION A-A
SCALE 1:100



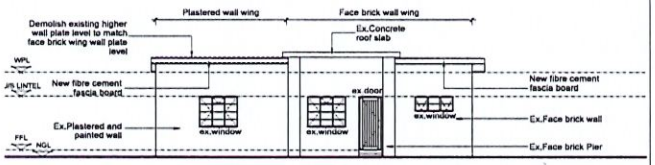
ELEVATION 3
SCALE 1:100



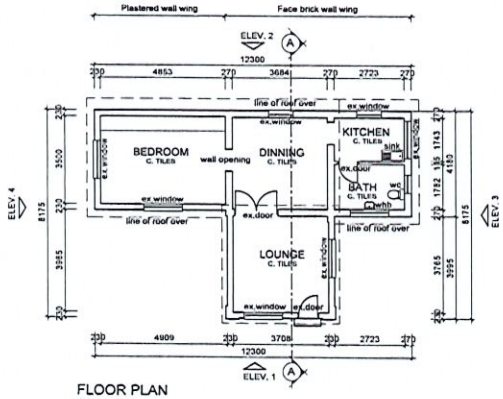
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SCALE 1:100



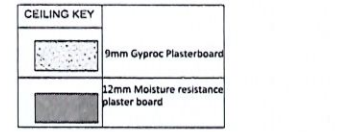
ELEVATION 4
SCALE 1:100

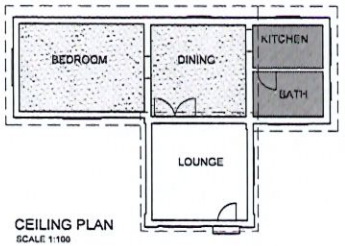


ELEVATION 1
SCALE 1:100

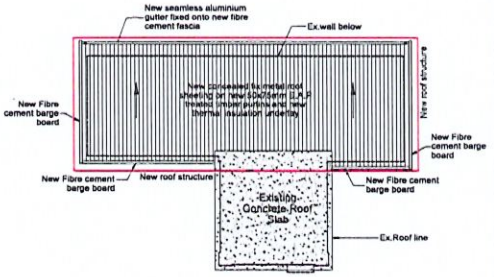


FLOOR PLAN
SCALE 1:100
AREA=67msq





CEILING PLAN
SCALE 1:100



ROOF PLAN
SCALE 1:100

Roof Sheeting

Double-interlocking concealed-fix Klip-Tite™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.58mm Z275 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waferhead screws type 17 to timber purlins.

- Poly closures to be to manufacturers recommendations.

Insulation

Alucool A1 Non-Combustible 135mm Foil Faced Glass Mineral wool as manufactured by Africa Thermal Insulations, use in-conjunction with White PVC Coated Wire placed @ 275mm apart and 48mm DS Tape. Installed as per manufacturers Guidelines.

Roof Flashing

Flashings specifications shall be to the Global Roofing Solutions standards and fixed to the sheeting with S10 brackets or, Sliding brackets at apex where roof sheets are 30m or longer, to obviate any direct fixing perforations. Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet in order to prevent any penetration of wind driven water. The trough shall be lipped at the eaves end to form a drip. Transverse flashing flanges shall be notched to the sheet profile where necessary. All these operations must be performed with special tools available from Global Roofing Solutions. Positive fix on eaves with minimum two screws per sheet as supplied by manufacturer.

Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 500mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

General Note

Every precaution shall be taken to prevent damage to roof sheets during all stages of construction. Duck boards should be used when necessary to protect the sheeting from damage. Sheeting which has become deformed or damaged in any way, should be replaced. Care shall be taken to ensure that no sheeting or flashing will be cut with abrasive disc on roof surfaces in order to prevent steel particles from penetrating coated surfaces.
The contractor shall exercise special care when handling long length sheeting, particularly in windy conditions. Should work be interrupted for any reason, all loose sheeting and incomplete sections must be adequately secured against possible movement by wind and gravity.

CEILING SPECIFICATION

Gyproc plaster Board Ceiling

9mm Gyproc Plasterboard Fixed with Drywall Screws at 150mm Centres to 38x50mm SAP brandering, Joints to be Covered with 50mm Wide Self Adhesive Glass Fibre Tape & Finished with Jointing Tape, Skimmed with Single Coat Rhinolite, Sanded Smooth, Rubbed Down, Brushed & Prepared to remove all Contaminants in Preparation to Receive 1x plascon primer, 1x coat plascon under coat and 2x coats of plascon velvaglo , Application & Fixing as per Manufacturers Specification.

Moisture resistant plaster board

Fit 12mm Moisture resistant plaster board on manufacture approval suspended grid system with tapered edge of board facing down with 25mm drywall screws at 150mm centres.Apply 50mm Jumbo tape to all joints and finish the entire ceiling with 3-5mm Jumbo skimming. Ceiling perimeter to be finished with prepared shadow line trim prepare substrate ensure that the surface is clean,dry,sound and free of defect .Apply 1 coat professional Gypsum & plaster prime ,allow to dry for minimum 16hrs.Apply 2 full coats of plascon Hygiene low sheen allow 2hrs drying time between coats.

CORNICE
coved plasterboard cornice, painted to match ceiling.

GENERAL DRAWING NOTES

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- CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL BY ARCHITECT PRIOR TO MANUFACTURE.

Revision:

No.:	Date:	Description:	Init.

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: SN	Scale: A1 on A1

Drawing Description:

DOCTOR'S HOUSE: FLOOR PLAN, ROOF PLAN, SECTION AND ELEVATIONS

Job no.: s558	Drawing no.: WD-100-6	Rev. no.:

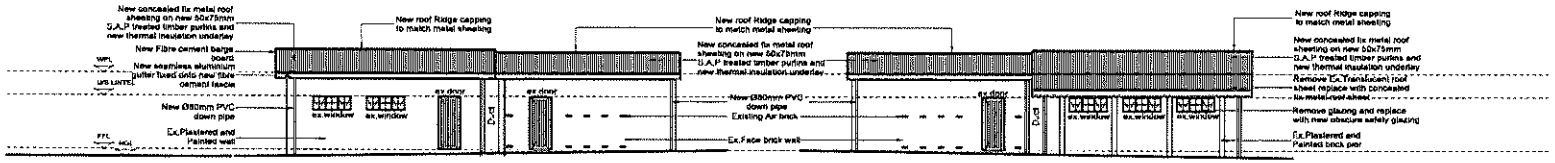
SAKHISIZWE A
ARCHITECTS

Signature: Date:

ISSUED FOR APPROVAL	
ISSUED FOR INFORMATION	
ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	

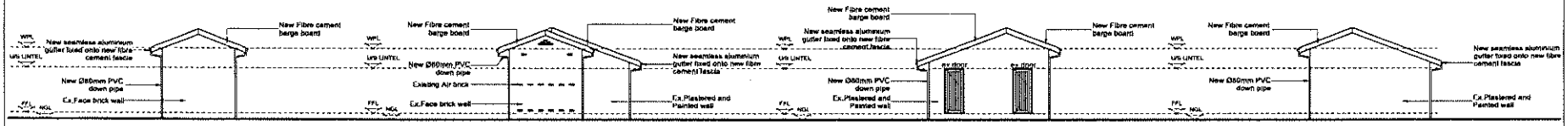
EXISTING ASBESTOS ROOF SHEETING

Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



ELEVATION 2
SCALE 1:100

ELEVATION 1
SCALE 1:100

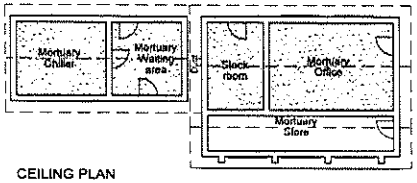


ELEVATION 5
SCALE 1:100

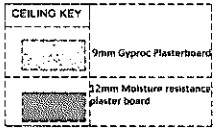
ELEVATION 4
SCALE 1:100

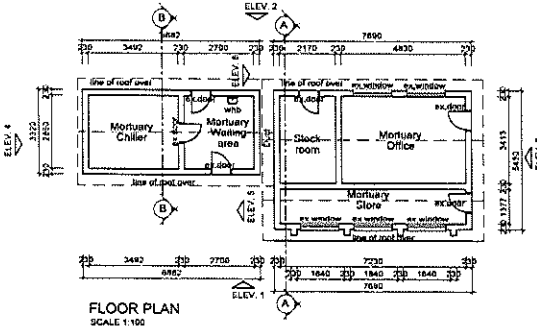
ELEVATION 3
SCALE 1:100

ELEVATION 6
SCALE 1:100

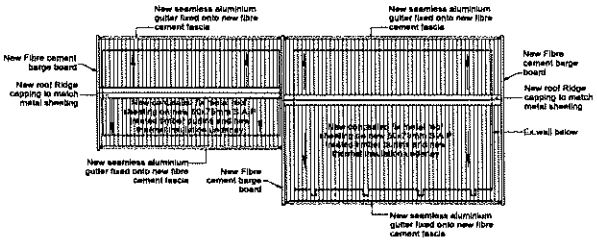


CEILING PLAN
SCALE 1:100

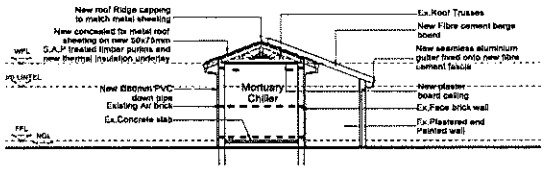




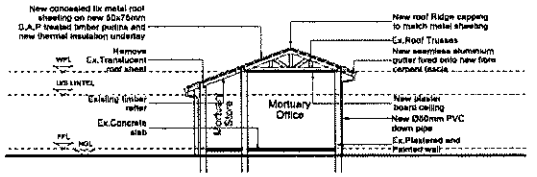
FLOOR PLAN
SCALE 1:100
AREA=64 mq



ROOF PLAN
SCALE 1:100



SECTION B-B
SCALE 1:100



SECTION A-A
SCALE 1:100

Roof Sheeting

Double-interlocking concealed-fix Klip-Tile™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.58mm Z275 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waterhead screws type 17 to timber purlins.

- Poly closures to be to manufacturers recommendations.

Roof Flashing

Flashings specifications shall be to the Global Roofing Solutions standards and fixed to the sheeting with S10 brackets or, Sliding brackets at apex where roof sheets are 30m or longer, to obviate any direct fixing perforations. Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet in order to prevent any penetration of wind driven water. The trough shall be lipped at the eaves end to form a drip. Transverse flashing flanges shall be notched to the sheet profile where necessary. All these operations must be performed with special tools available from Global Roofing Solutions. Positive fix on eaves with minimum two screws per sheet as supplied by manufacturer.

Insulation

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Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 500mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

General Note

Every precaution shall be taken to prevent damage to roof sheets during all stages of construction. Duck boards should be used when necessary to protect the sheeting from damage. Sheeting which has become deformed or damaged in any way, should be replaced. Care shall be taken to ensure that no sheeting or flashing will be cut with abrasive disc on roof surfaces in order to prevent steel particles from penetrating coated surfaces.

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CEILING SPECIFICATION

Gyproc plaster Board Ceiling

9mm Gyproc Plasterboard Fixed with Drywall Screws at 150mm Centres to 38x50mm SAP Brandering, Joints to be Covered with 50mm Wide Self Adhesive Glass Fibre Tape & Finished with Jointing Tape, Skimmed with Single Coat Rhinolite, Sanded Smooth, Rubbed Down, Brushed & Prepared to remove all Contaminants in Preparation to Receive 1x plascon primer, 1x coat plascon under coat and 2x coats of plascon velvaglo , Application & Fixing as per Manufacturers Specification.

Moisture resistant plaster board

Fit 12mm Moisture resistant plaster board on manufacture approval suspended grid system with tapered edge of board facing down with 25mm drywall screws at 150mm centres.Apply 50mm Jumbo tape to all joints and finish the entire ceiling with 3-5mm Jumbo skimming. Ceiling perimeter to be finished with prepared shadow line trim prepare substrate ensure that the surface is clean,dry,sound and free of defect .Apply 1 coat professional Gypsum & plaster prime ,allow to dry for minimum 1Ghrs.Apply 2 full coats of plascon Hygiene low sheen allow 2hrs drying time between coats.

GENERAL DRAWING NOTES

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Revision:

No.:	Date:	Description:	Init.

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: EN	Scale: A1 on A1

Drawing Description:

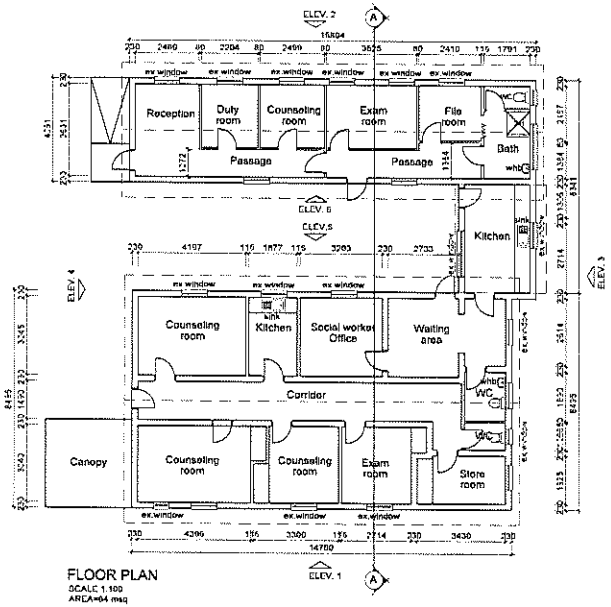
MORTUARY: FLOOR PLAN, ROOF PLAN, SECTION AND ELEVATIONS

Job no.	Drawing no.	Rev. no.
s655	WD-100-8	

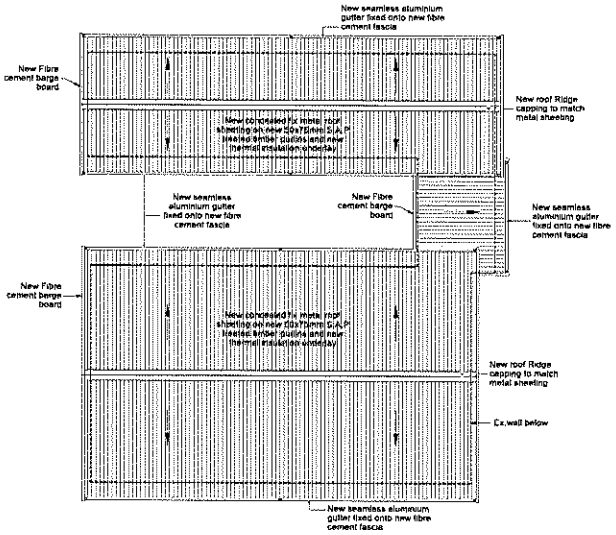
SAKHISIZWE ARCHITECTS

Signature: Date:

ISSUED FOR APPROVAL	
ISSUED FOR INFORMATION	
ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	



FLOOR PLAN
SCALE 1:100
AREA=64 msq



ROOF PLAN
SCALE 1:100

EXISTING ASBESTOS ROOF SHEETING

Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.

ROOF SPECIFICATION

Roof Sheeting

Remove ex. roof structure & asbestos sheets, gutter, fascia and barge by specialist and all rain water goods. Replace with double-interlocking concealed-fix Klip-Tite™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.68mm Z275 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer, sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waterhead screws type 17 to timber purlins.

- Poly closures to be to manufacturers recommendations.

Insulation

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Roof Flashing

Flashings specifications shall be to the Global Roofing Solutions standards and fixed to the sheeting with 510 brackets or, Sliding brackets at apex where roof sheets are 30m or longer, to obsolete any direct fixing perforations. Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet in order to prevent any penetration of wind driven water. The trough shall be lipped at the eaves end to form a drip. Transverse flashing flanges shall be notched to the sheet profile where necessary. All these operations must be performed with special tools available from Global Roofing Solutions. Positive fix on eaves with minimum two screws per sheet as supplied by manufacturer.

Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 500mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

CEILING SPECIFICATION

Gyproc plaster Board Ceiling

9mm Gyproc Plasterboard Fixed with Drywall Screws at 150mm Centres to 38x50mm SAP brandering, Joints to be Covered with 50mm Wide Self Adhesive Glass Fibre Tape & Finished with Jointing Tape, Skimmed with Single Coat Rhinolite, Sanded Smooth, Rubbed Down, Brushed & Prepared to remove all Contaminants in Preparation to Receive 1x plascon primer, 1x coat plascon under coat and 2x coats of plascon velvaglo , Application & Fixing as per Manufacturers Specification.

Moisture resistant plaster board

Fit 12mm Moisture resistant plaster board on manufacture approval suspended grid system with tapered edge of board facing down with 25mm drywall screws at 150mm centres.Apply 50mm Jumbo tape to all joints and finish the entire ceiling with 3-5mm Jumbo skimming.
Ceiling perimeter to be finished with prepared shadow line trim prepare substrate ensure that the surface is clean,dry,sound and free of defect .Apply 1 coat professional Gypsum & plaster prime ,allow to dry for minimum 16hrs.Apply 2 full coats of plascon Hygiene low sheen allow 2hrs drying time between coats.

CORNICE

coved plasterboard cornice, painted to match ceiling.

General Note

Every precaution shall be taken to prevent damage to roof sheets during all stages of construction. Duck boards should be used when necessary to protect the sheeting from damage. Sheeting which has become deformed or damaged in any way, should be replaced. Care shall be taken to ensure that no sheeting or flashing will be cut with abrasive disc on roof surfaces in order to prevent steel particles from penetrating coated surfaces.
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Revision:

No.	Date	Description:	Init.

Client: Date

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.01.18	Drawn: SN	Scale: A1 on A1

Drawing Description:

CRISIS CENTRE & WOMEN HEALTH: FLOOR PLAN & ROOF PLAN

Job no.	Drawing no.	Rev. no.
s568	TD-100-9 & 10	*

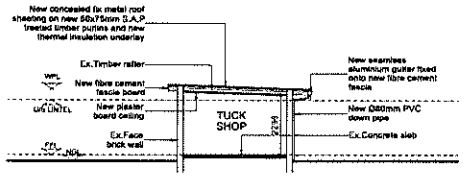
SAKHISIZWE ARCHITECTS

Signature: Date:

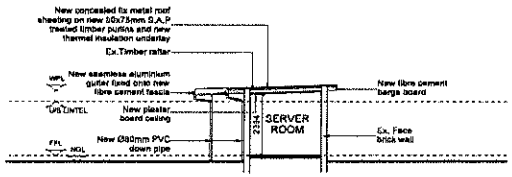
ISSUED FOR APPROVAL	
ISSUED FOR INFORMATION	
ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	

EXISTING ASBESTOS ROOF SHEETING

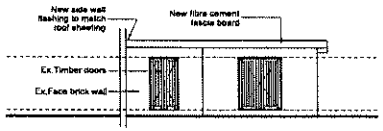
Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



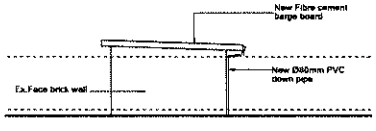
SECTION A A
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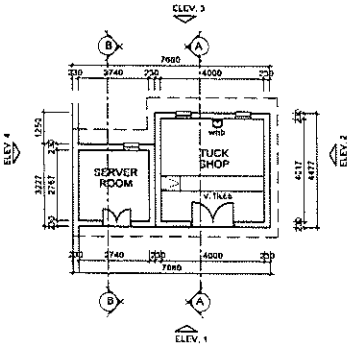
SECTION B B
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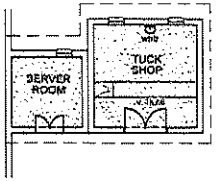
ELEVATION 1
SCALE 1:100



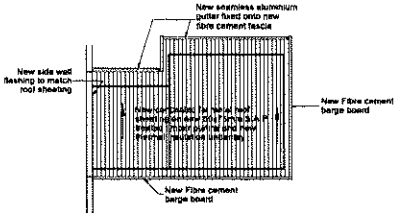
ELEVATION 2
SCALE 1:100



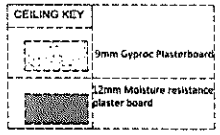
FLOOR PLAN
SCALE 1:100



CEILING LAYOUT PLAN
SCALE 1:100



ROOF PLAN
SCALE 1:100



CEILING SPECIFICATION

Gyproc plaster Board Ceiling

9mm Gyproc Plasterboard Fixed with Drywall Screws at 150mm Centres to 38x50mm SAP brandering, Joints to be Covered with 50mm Wide Self Adhesive Glass Fibre Tape & Finished with Jointing Tape, Skimmed with Single Coat Rhinolite, Sanded Smooth, Rubbed Down, Brushed & Prepared to remove all Contaminants in Preparation to Receive 1x plascon primer, 1x coat plascon under coat and 2x coats of plascon velvaglo , Application & Fixing as per Manufacturers Specification.

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CORNICE
coved plasterboard cornice, painted to match ceiling.

Roof Sheeting

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- Poly closures to be to manufacturers recommendations.

Insulation

Alucool A1 Non-Combustible 135mm Foil Faced Glass Mineral wool as manufactured by Africa Thermal Insulations, use in-conjunction with White PVC Coated Wire placed @ 275mm apart and 48mm DS Tape. Installed as per manufacturers Guidelines.

Roof Flashing

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Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 600mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

General Note

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The contractor shall exercise special care when handling long length sheeting, particularly in windy conditions. Should work be interrupted for any reason, all loose sheeting and incomplete sections must be adequately secured against possible movement by wind and gravity.

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- CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL BY ARCHITECT PRIOR TO MANUFACTURE.

Revision:

No.:	Date:	Description:	Init.

Client: Date:

Project Title

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: SN	Scale: As on A1

Drawing Description:

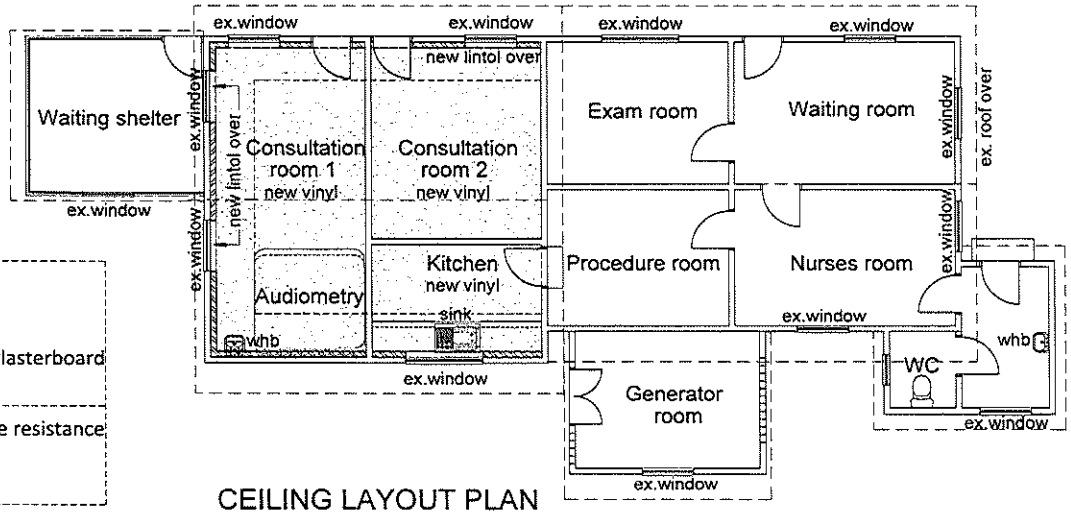
TUCK SHOP & SERVER: FLOOR PLAN, ROOF PLAN, SECTION AND ELEVATIONS

Job no.: s558	Drawing no.: WD-100-14	Rev. no.:

SAKHISIZWE ARCHITECTS

Signature: Date:

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ISSUED FOR INFORMATION	
ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	



CEILING LAYOUT PLAN

SCALE 1:50

CEILING KEY	
	9mm Gyproc Plasterboard
	12mm Moisture resistance plaster board

ROOF SPECIFICATION

RC Waterproofing

Strip existing waterproofing, install screed to fall and lay one-layer Derbigum SP4 waterproofing membrane with 75mm side and 100mm end laps. Sealed to primed surface to falls and cross falls by "torch-fusion" finished with two coats of bituminous aluminium paint. Waterproofing is to be installed by an approved Derbigum contractor under a ten year guarantee

Roof Sheeting

Double-interlocking concealed-fix Klip-Tile™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.58mm Z275 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. Sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waterhead screws type 17 to timber purlins.

- Poly closures to be to manufacturers recommendations.

Insulation

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Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 500mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

General Note

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CEILING SPECIFICATION

Gyproc plaster_Board Ceiling

9mm Gyproc Plasterboard Fixed with Drywall Screws at 150mm Centres to 38x50mm SAP brandering. Joints to be Covered with 50mm Wide Self Adhesive Glass Fibre Tape & Finished with Jointing Tape, Skimmed with Single Coat Rhinolite, Sanded Smooth, Nubbed Down, Brushed & Prepared to remove all Contaminants in Preparation to Receive 1x plascon primer, 1x coat plascon under coat and 2x coats of plascon velvaglo , Application & Fixing as per Manufacturers Specification.

Moisture resistant plaster board

Fit 12mm Moisture resistant plaster board on manufacture approval suspended grid system with tapered edge of board facing down with 25mm drywall screws at 150mm centres.Apply 50mm Jumbo tape to all joints and finish the entire ceiling with 3-5mm Jumbo skimming. Ceiling perimeter to be finished with prepared shadow line trim prepare substrate ensure that the surface is clean,dry,sound and free of defect .Apply 1 coat professional Gypsum & plaster prime ,allow to dry for minimum 16hrs.Apply 2 full coats of plascon Hygiene low sheen allow 2hrs drying time between coats.

CORNICT

coved plasterboard cornice, painted to match ceiling.

EXISTING ASBESTOS ROOF SHEETING

Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.

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Revision:

No.:	Date:	Description:	Init.

Client:

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.01.19	Drawn: SN	Scale:

Drawing Description:

OCCUPATIONAL HEALTH & AUDIOMETRY : CEILING PLAN

Job no.:	Drawing no.:	Rev. no.:
4655	WD-101-7	

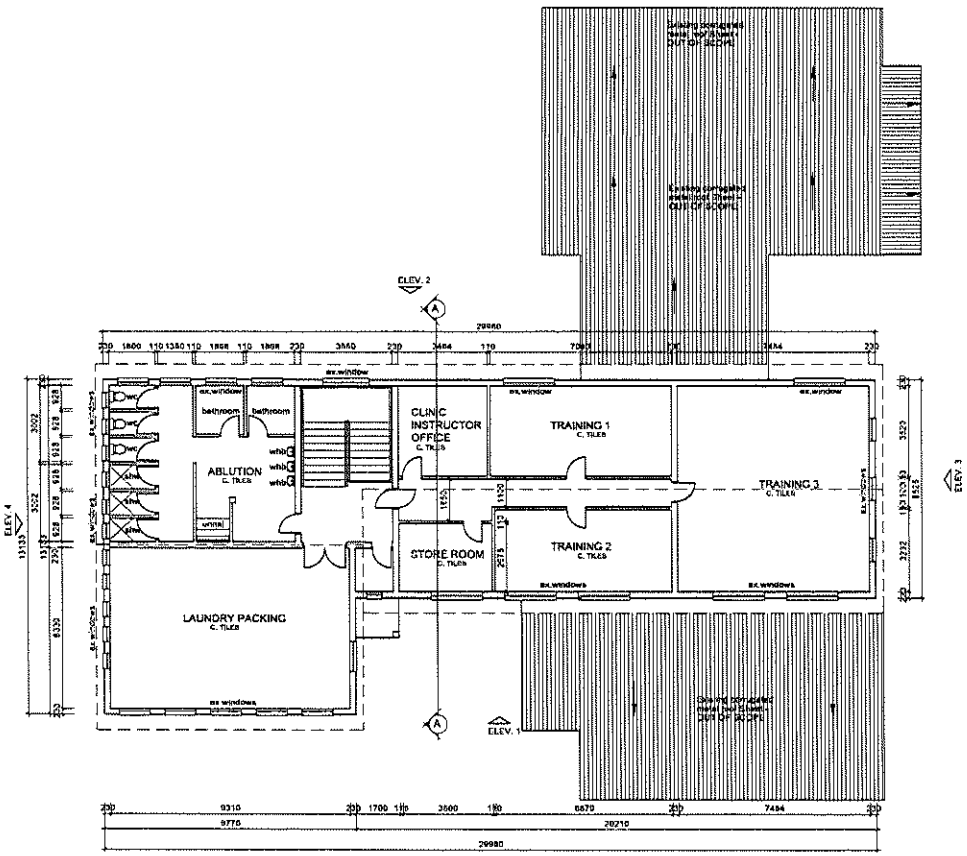
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Signature Date:

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ISSUED FOR INFORMATION	
ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	

EXISTING ASBESTOS ROOF SHEETING

Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



FIRST FLOOR PLAN
SCALE 1:100
AREA=348 msq

CEILING SPECIFICATION

Gyproc plaster Board Ceiling

9mm Gyproc Plasterboard Fixed with Drywall Screws at 150mm Centres to 38x50mm SAP brandering, Joints to be Covered with 50mm Wide Self Adhesive Glass Fibre Tape & Finished with Jointing Tape, Skimmed with Single Coat Rhinolite, Sanded Smooth, Rubbed Down, Brushed & Prepared to remove all Contaminants in Preparation to Receive 1x plascon primer, 1x coat plascon under coat and 2x coats of plascon velvaglo , Application & Fixing as per Manufacturers Specification.

Moisture resistant plaster board

Fit 12mm Moisture resistant plaster board on manufacture approval suspended grid system with tapered edge of board facing down with 25mm drywall screws at 150mm centres.Apply 50mm jumbo tape to all joints and finish the entire ceiling with 3-5mm Jumbo skimming. Ceiling perimeter to be finished with prepared shadow line trim prepare substrate ensure that the surface is clean,dry,sound and free of defect .Apply 1 coat professional Gypsum & plaster prime ,allow to dry for minimum 16hrs.Apply 2 full coats of plascon Hygiene low sheen allow 2hrs drying time between coats.

CORNICE
coved plasterboard cornice, painted to match ceiling.

Roof Sheeting

Double-interlocking concealed-fix Klip-Tite™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.58mm Z275 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. sheeting to be finished with a Chromadek® Utilm colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waferhead screws type 17 to timber purlins.

* Poly closures to be to manufacturers recommendations.

Insulation

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Roof Flashing

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Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 600mm centres.

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General Note

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Revision:

No.	Date:	Description.	Init.

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: SN	Scale: A1 on A1

Drawing Description:

LAUNDRY: FIRST FLOOR PLAN

Job no.:	Drawing no.:	Rev. no.:
e558	WD-101-5	

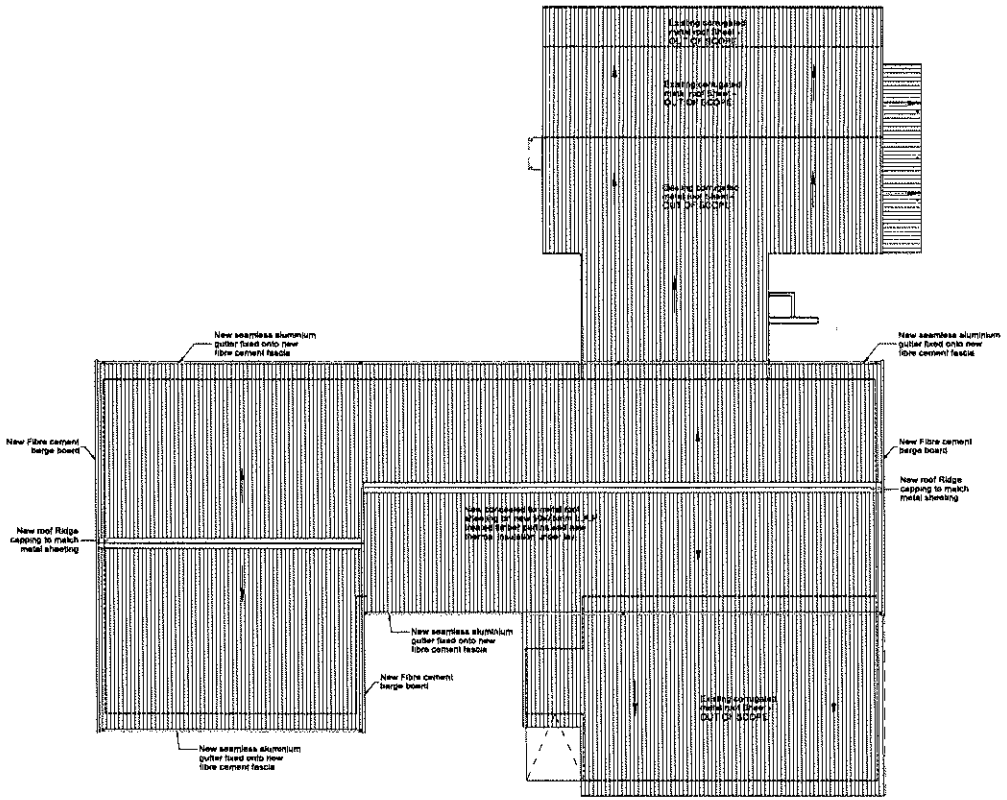
SAKHISIZWE ARCHITECTS

Signature: Date:

ISSUED FOR APPROVAL	
ISSUED FOR INFORMATION	
ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	

EXISTING ASBESTOS ROOF SHEETING

Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



ROOF PLAN
SCALE 1:100

CEILING SPECIFICATION

Gyproc plaster Board Ceiling

9mm Gyproc Plasterboard Fixed with Drywall Screws at 150mm Centres to 38x50mm SAP brandering, Joints to be Covered with 50mm Wide Self Adhesive Glass Fibre Tape & Finished with Jointing Tape, Skimmed with Single Coat Rhinolite, Sanded Smooth, Rubbed Down, Brushed & Prepared to remove all Contaminants in Preparation to Receive 1x plascon primer, 1x coat plascon under coat and 2x coats of plascon velvaglo , Application & Fixing as per Manufacturers Specification.

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CORNICE
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Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 500mm centres.

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General Note

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Revision:

No.:	Date:	Description:	Init.

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: SN	Scale: A3 on A1

Drawing Description:

LAUNDRY: ROOF PLAN

Job no.	Drawing no.	Rev. no.
a558	WD-102-5	

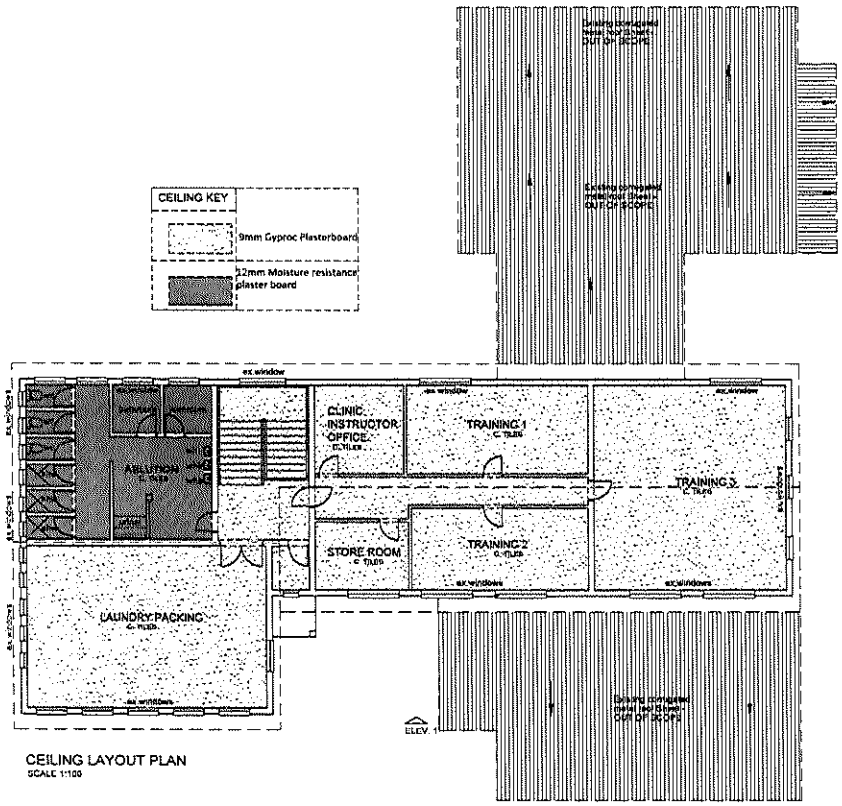
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Signature: Date:

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ISSUED FOR INFORMATION	
ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	

EXISTING ASBESTOS ROOF SHEETING

Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



CEILING LAYOUT PLAN
SCALE 1:100

CEILING SPECIFICATION

Gyproc plaster Board Ceiling

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CORNICE
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Revision:

No.	Date:	Description:	Init.

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: SN	Scale: As on A1

Drawing Description:

LAUNDRY: CEILING LAYOUT

Job no.:	Drawing no.:	Rev. no.:
s558	WD-103-S	

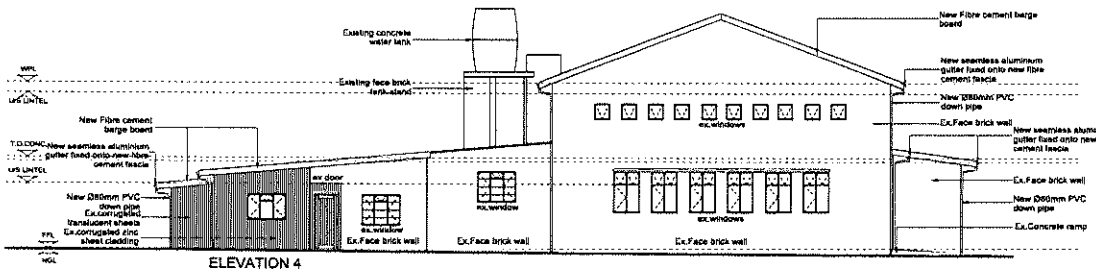
SAKHISIZWE ARCHITECTS

Signature: Date:

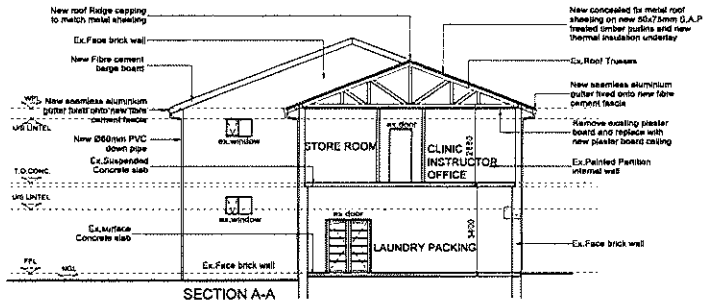
ISSUED FOR APPROVAL	
ISSUED FOR INFORMATION	
ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	

EXISTING ASBESTOS ROOF SHEETING

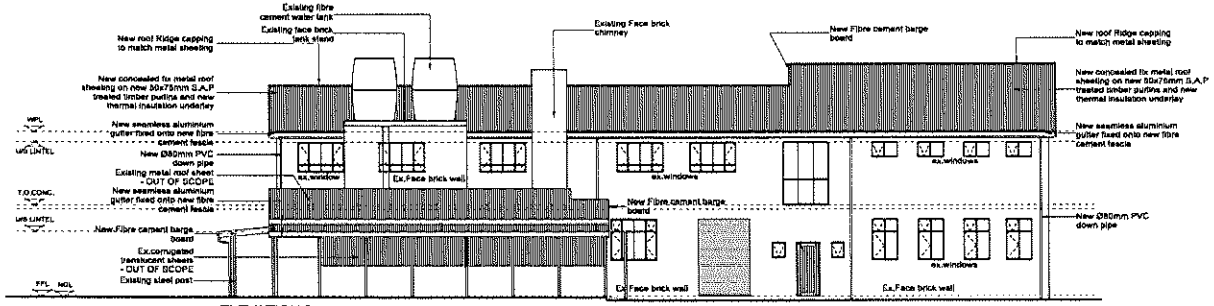
Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



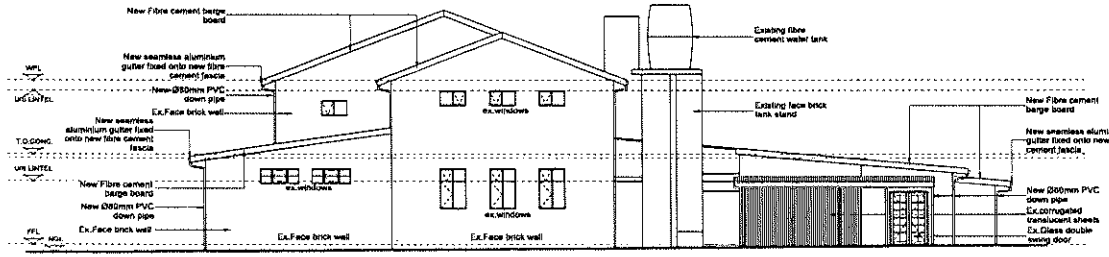
ELEVATION 4
SCALE 1:100



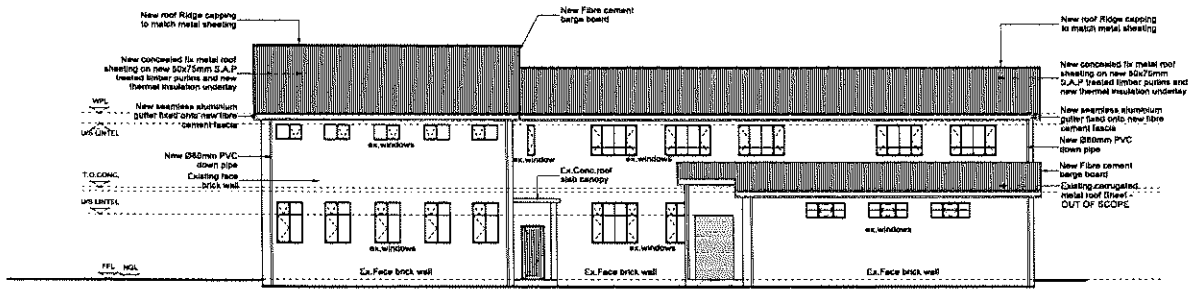
SECTION A-A
SCALE 1:100



ELEVATION 2
SCALE 1:100



ELEVATION 3
SCALE 1:100



ELEVATION 1
SCALE 1:100

CEILING SPECIFICATION

Gyproc plaster Board Ceiling

9mm Gyproc Plasterboard Fixed with Drywall Screws at 150mm Centres to 38x50mm SAP brandering. Joints to be Covered with 50mm Wide Self Adhesive Glass Fibre Tape & Finished with Jointing Tape, Skimmed with Single Coat Rhinolite, Sanded Smooth, Rubbed Down, Brushed & Prepared to remove all Contaminants in Preparation to Receive 1x plascon primer, 1x coat plascon under coat and 2x coats of plascon velvaglo , Application & Fixing as per Manufacturers Specification.

Roof Sheeting

Double-interlocking concealed-fix Klip-Tile™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.50mm ZZ75 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waterhead screws type 17 to timber purlins.

* Poly closures to be to manufacturers recommendations.

Insulation

Alucool A1 Non-Combustible 135mm Foil Faced Glass Mineral wool as manufactured by Africa Thermal Insulations, use in-conjunction with White PVC Coated Wire placed @ 275mm apart and 48mm OS Tape. Installed as per manufacturers Guidelines.

Roof Flashing

Flashings specifications shall be to the Global Roofing Solutions standards and fixed to the sheeting with S10 brackets or, Sliding brackets at apex where roof sheets are 30m or longer, to obviate any direct fixing perforations. Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet in order to prevent any penetration of wind driven water. The trough shall be lipped at the eaves end to form a drip. Transverse flashing flanges shall be notched to the sheet profile where necessary. All these operations must be performed with special tools available from Global Roofing Solutions. Positive fix on eaves with minimum two screws per sheet as supplied by manufacturer.

Rainwater Goods

Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 500mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

General Note

Every precaution shall be taken to prevent damage to roof sheets during all stages of construction. Duck boards should be used when necessary to protect the sheeting from damage. Sheeting which has become deformed or damaged in any way, should be replaced. Care shall be taken to ensure that no sheeting or flashing will be cut with abrasive disc on roof surfaces in order to prevent steel particles from penetrating coated surfaces.
The contractor shall exercise special care when handling long length sheeting, particularly in windy conditions. Should work be interrupted for any reason, all loose sheeting and incomplete sections must be adequately secured against possible movement by wind and gravity.

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- CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL BY ARCHITECT PRIOR TO MANUFACTURE.

Revision:

No.:	Date:	Description:	Init.

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21	Drawn: SN	Scale: A1 on A1

Drawing Description:

LAUNDRY: ELEVATIONS & SECTIONS

Job no.:	Drawing no.:	Rev. no.:
s658	WD-200-5	

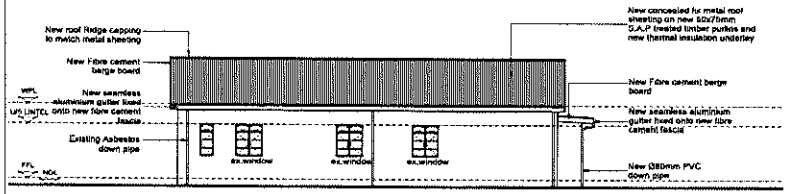
SAKHISIZWE ARCHITECTS

Signature: Date:

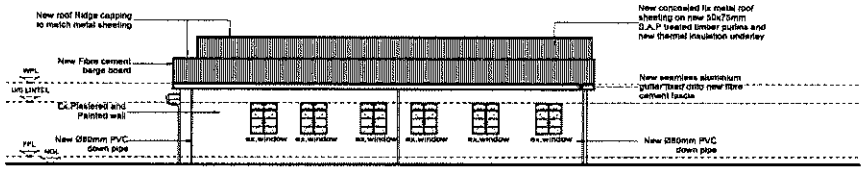
ISSUED FOR APPROVAL	
ISSUED FOR INFORMATION	
ISSUED FOR SUBMISSION	
ISSUED FOR TENDER	
ISSUED FOR CONSTRUCTION	

EXISTING ASBESTOS ROOF SHEETING

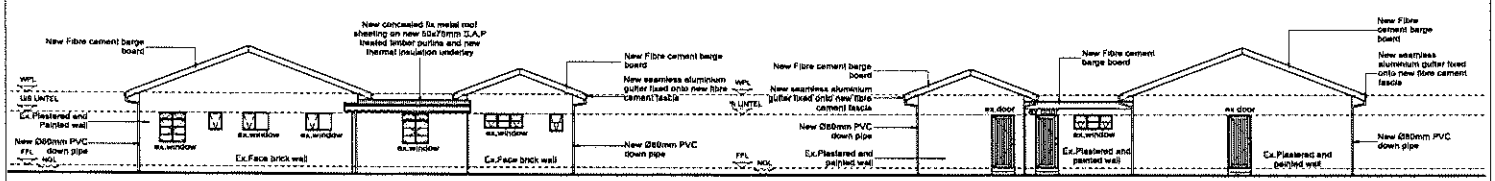
Remove all asbestos sheeting and associated rain water goods including but not limited to fascias, barges, gutters, downpipes and timber purlins.



ELEVATION 1
SCALE 1:100

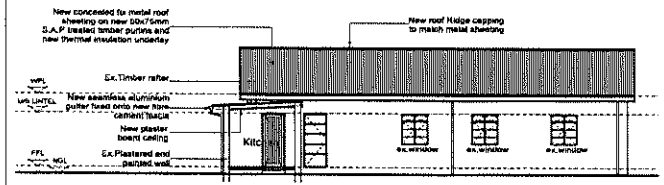


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SCALE 1:100

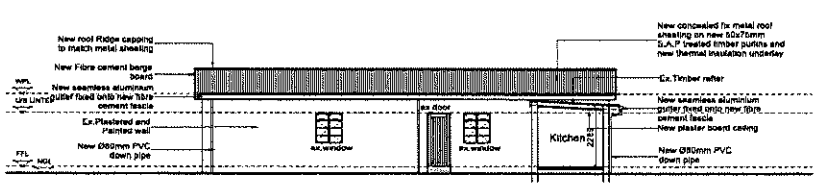


ELEVATION 3
SCALE 1:100

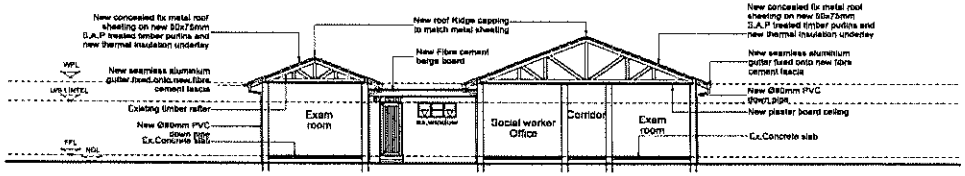
ELEVATION 4
SCALE 1:100



ELEVATION 5
SCALE 1:100



ELEVATION 6
SCALE 1:100



SECTION A-A
SCALE 1:100

General Note

Every precaution shall be taken to prevent damage to roof sheets during all stages of construction. Duck boards should be used when necessary to protect the sheeting from damage. Sheeting which has become deformed or damaged in any way, should be replaced. Care shall be taken to ensure that no sheeting or flashing will be cut with abrasive disc on roof surfaces in order to prevent steel particles from penetrating coated surfaces.
The contractor shall exercise special care when handling long length sheeting, particularly in windy conditions. Should work be interrupted for any reason, all loose sheeting and incomplete sections must be adequately secured against possible movement by wind and gravity.

Roof Sheeting

Double-interlocking concealed-fix Klip-Tite™ 700 profile roll-formed in continuous lengths and cut to length by a pneumatic cut-off process from certified 0.55mm Z275 Galvanised steel. A certificate verifying compliance shall be issued by the manufacturer. sheeting to be finished with a Chromadek® Ultim colour coated finish to one side with a Pebble Grey backing coat to other, to be fixed to every purlin by means of patented KL700 clips having spure which will securely hold the sheets in position and lock-in the sidelap and both centre ribs. The KL700 clips shall be manufactured from Galvanized steel and shall be fixed with the appropriate self-drilling/tapping screws to steel purlins (selection from installation manual) OR with ZAP no. 10x45mm Waterhead screws type 17 to timber purlins.

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Flashings specifications shall be to the Global Roofing Solutions standards and fixed to the sheeting with G10 brackets or, Sliding brackets at apex where roof sheets are 30m or longer, to obviate any direct fixing perforations. Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet in order to prevent any penetration of wind driven water. The trough shall be tipped at the eaves end to form a drip. Transverse flashing flanges shall be notched to the sheet profile where necessary. All these operations must be performed with special tools available from Global Roofing Solutions. Positive fix on eaves with minimum two screws per sheet as supplied by manufacturer.

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Remove existing gutters and replace them with new 150 x125 x 0.6mm Aluminium profiled gutter with brackets fixed at 500mm centres.

Remove existing downpipes and replace with new white 100 x 75mm fluted aluminium rainwater downpipes and baked enamel finish

CEILING SPECIFICATION

Gyproc plaster Board Ceiling

9mm Gyproc Plasterboard Fixed with Drywall Screws at 150mm Centres to 38x50mm SAP brandering, Joints to be Covered with 50mm Wide Self Adhesive Glass Fibre Tape & Finished with Jointing Tape, Skimmed with Single Coat Rhinolite, Sanded Smooth, Rubbed Down, Brushed & Prepared to remove all Contaminants in Preparation to Receive 1x plascon primer, 1x coat plascon under coat and 2x coats of plascon velvaglo , Application & Fixing as per Manufacturers Specification.

Moisture resistant plaster board

Fit 12mm Moisture resistant plaster board on manufacture approval suspended grid system with tapered edge of board facing down with 25mm drywall screws at 150mm centres.Apply 50mm Jumbo tape to all joints and finish the entire ceiling with 3-5mm Jumbo skimming. Ceiling perimeter to be finished with prepared shadow line trim prepare substrate ensure that the surface is clean,dry,sound and free of defect .Apply 1 coat professional Gypsum & plaster prime ,allow to dry for minimum 16hrs.Apply 2 full coats of plascon Hygiene low sheen allow 2hrs drying time between coats.

CORNICE
Coved plasterboard cornice, painted to match ceiling.

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Revision:

No.:	Date:	Description:	Init.

Client: Date:

Project Title:

St. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

Date: 2023.11.21 | Drawn: BN | Scale: As on A1

Drawing Description:

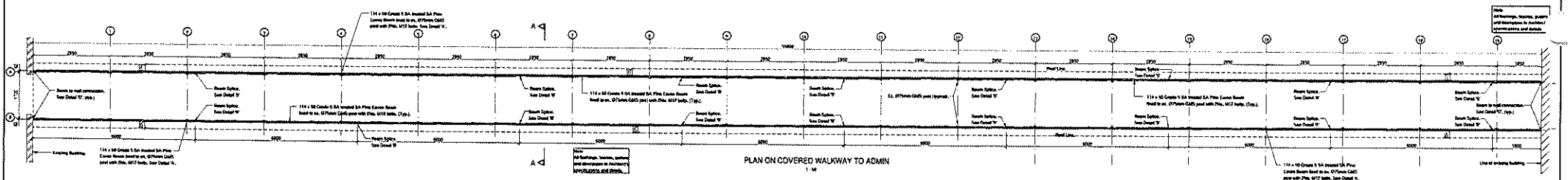
CRISIS CENTRE & WOMEN HEALTH: SECTION & ELEVATIONS

Job no.	Drawing no.	Rev. no.
s558	WD-200-S & 10	*

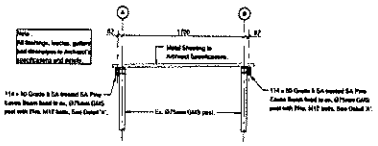
SAKHISIZWE ARCHITECTS

Signature: Date:

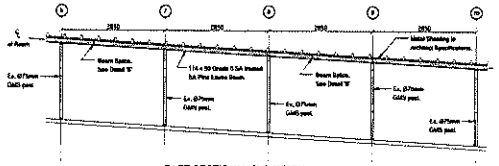
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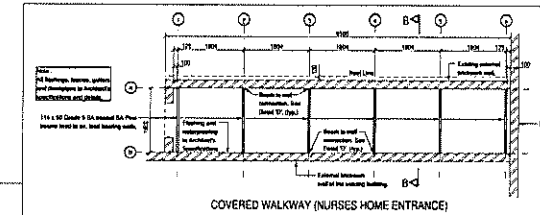
PLAN ON COVERED WALKWAY TO ADMIN
1 : 50



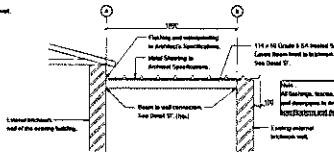
TYPICAL SECTION A - A
THROUGH COVERED WALKWAY TO ADMIN
1 : 25



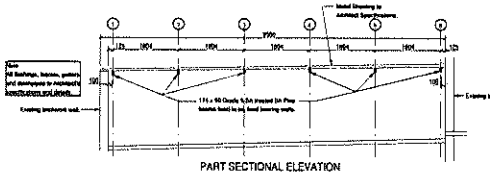
PART SECTIONAL ELEVATION
THROUGH COVERED WALKWAY TO ADMIN
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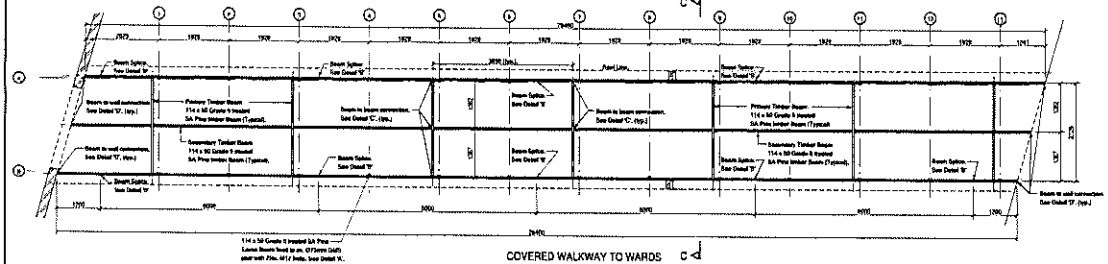
COVERED WALKWAY (NURSES HOME ENTRANCE)
1 : 50



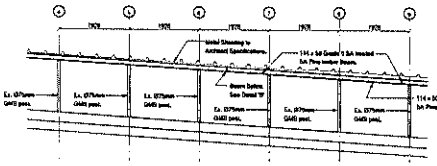
TYPICAL SECTION B - B
THROUGH COVERED WALKWAY (NURSES HOME ENTRANCE)
1 : 25



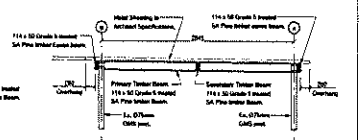
PART SECTIONAL ELEVATION
THROUGH COVERED WALKWAY (NURSES HOME ENTRANCE)
1 : 50



COVERED WALKWAY TO WARDS
1 : 50



PART SECTIONAL ELEVATION
THROUGH COVERED WALKWAY TO WARDS
1 : 50



TYPICAL SECTION C - C
THROUGH COVERED WALKWAY TO WARDS
1 : 25

Structural Timber Notes

1. All timber work is to be SA Pine Timber, Grade 'S' with structural steel plate and connections.
2. The Contractor is to note
   a) 2 Set of fabrication shop drawings (hard copies) are to be delivered to the Engineer's offices for review and approval before commencing with any fabrication.
   Note: Email submission of electronic (PDF) copies of shop drawings will NOT be accepted.
   b) Grade compliance is to be achieved through certification of an ISO 17065 accredited certification body, i.e. SABS or South African Technical Auditing Services. Certification is required for all timber.
   c) Markings on all timber must read type of wood, stress grade, size, certification mark of certification body, manufacturer's name and unit application class.
   d) Timber preservation must be in line with the South African Wood Preservers Association recommendations.
   e) Treatment used must be in accordance with SANS 10005 - Treatment of Timber (quality approved) must be approved by the Structural Engineer.

Structural Steel Notes

1. All work to be in accordance with SANS 10024.
2. All welds to be min. 6mm continuous fillet welds (unless otherwise noted).
3. All structural steelwork to be Grade S355JR (unless otherwise noted).
4. All bolts to be Grade 8.8 bolts and to be hot dipped galvanized in SANS 121:2011 (ISO 1461:2009 (E)).
5. All structural steelwork, bolts, nuts and washers to be hot dipped galvanized to SANS 121:2011 (ISO 1461:2009 (E)). Galvanizing Certificate for all steel work is to be submitted to the Engineer on completion.
6. 2 Set of fabrication shop drawings (hard copies) are to be delivered to the Engineer's offices for review and approval before commencing with any fabrication.
   Note: Email submission of electronic (PDF) copies of shop drawings will NOT be accepted.
7. Certificates confirming the grade stress of all steel bars, purlins and bolts specified is to be submitted to the Engineer on completion.
8. The Structural Steelwork Contractor is to verify all setting out dimensions on site prior to fabrication.

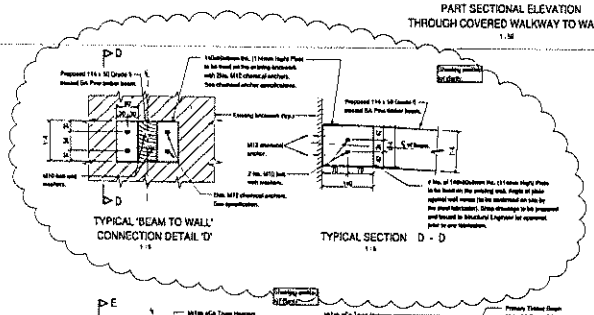
WELDING & BOLTING SPECIFICATION

Isolate M12 (8.8) galvanised H.D. bolted Grade mild steel components tongue + tabbed with Fischer FIS-I 345 Chemical Mortar or equally approved Chemical Anchors with 1.3 W x Embedment (without washer).

Note:
All fastings, fascias, gutters and downpipes to Architect's specifications and details.

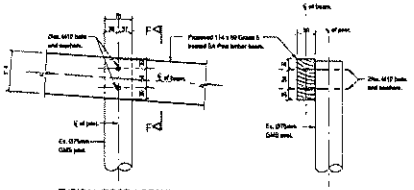
The roof sheeting to Architect's Specifications and Details.
NOTE: All roof sheeting to have positive fixing in accordance with 'Global Roof Specifications and Details'.

This drawing is to be read in conjuction with Architect Drw. No.s558/WD-100-1,11 & 13



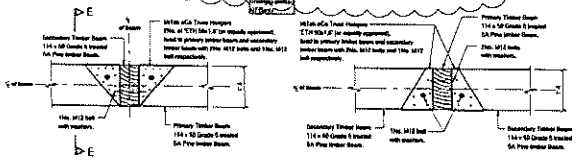
TYPICAL 'BEAM TO WALL'
CONNECTION DETAIL 'D'
1 : 5

TYPICAL SECTION D - D
1 : 5



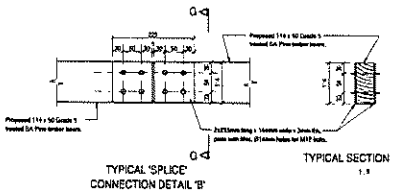
TYPICAL 'POST & BEAM'
CONNECTION DETAIL 'A'
1 : 5

TYPICAL SECTION F - F
1 : 5



TYPICAL 'BEAM TO BEAM'
CONNECTION DETAIL 'C'
1 : 5

TYPICAL SECTION E - E
1 : 5



TYPICAL 'SPLICE'
CONNECTION DETAIL 'B'
1 : 5

TYPICAL SECTION G - G
1 : 5

FOR TENDER

REV	DESCRIPTION	BY	DATE
P3	FOR TENDER DETAIL 'E' AMENDED.	M.K.	20/02/2024
P2	REVISED AS PER REVISION CLOUD	S.H.	16/11/2023
P1	FOR APPROVAL	S.H.	31/03/2023

CLIENT
health
Department
Health
PROVINCE OF KWAZULU-NATAL

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

ARCHITECTS
SAKHISIZWE ARCHITECTS

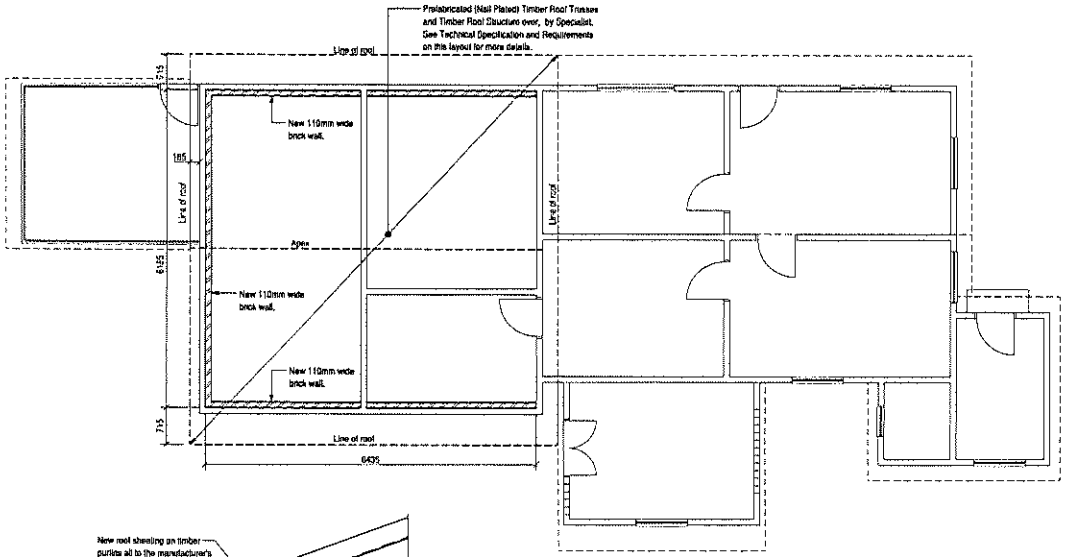
PROJECT
St ANDREWS HOSPITAL - ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

DETAILS
WALKWAYS :
. STRUCTURAL LAYOUT AND DETAILS

MAP AFRICA

DESIGNED	S.N.	SCALES
Checked	S.N.	A3 SHOWN
APPROVED	S.H.	DATE 31-03-2023

DRAWING No. 545 / 301 REV P3



Technical Specifications and Requirements for : Prefabricated (Nail Plated) Timber Roof Trusses :

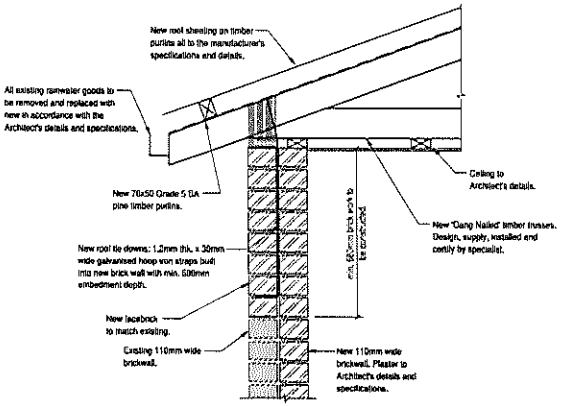
1. The appointed Principle Building Contractor (PBC) is to note that the installation of all the prefabricated (nail plated) timber roof trusses must be carried out as a 'Design, Supply, Install and Certify' Contract.
2. The Structural Design of the prefabricated (nail plated) roof trusses must be carried out by an 'Approved Competent Person', who is professionally registered with ECSA, in terms of the Engineering Profession Act, 2000, (Act No. 46 of 2000). The Structural Design of the prefabricated (nail plated) roof trusses must be carried out in accordance with the requirements of the following South African National Standards : SANS 10160, SANS 10163 and SANS 10243.
3. In accordance with the statutory requirements of the 'The South African National Building Regulations' - SANS 10400-A, Clause A19, the 'Approved Competent Person', who was responsible for the structural design of the prefabricated (nail plated) timber roof trusses, must submit a 'TR1 - Compliance and Completion Certificate' confirming the structural stability of the roof structure, to the Principle Structural Engineer (PSE), on completion of the roof truss installation
4. The prefabricated (nail plated) timber roof trusses must be manufactured by an accredited ITC-SA fabricator
5. The timber truss fabricator is to verify all setting out dimensions on-site, prior to any fabrication taking place.
6. A full set of 'Shop Drawings' (confirming all on-site dimensions, structural design information, truss tie down details, cross bracing details, etc), must be submitted by the Principle Building Contractor (PBC) to the Principle Structural Engineer (PSE) for review and approval, prior to any fabrication taking place.
7. The on-site inspection of the installation of the prefabricated (nail plated) roof trusses must be carried out by an 'Approved Competent Person', who is professionally registered with ECSA, in terms of the Engineering Profession Act, 2000, (Act No. 46 of 2000).
8. In accordance with the statutory requirements of the 'The South African National Building Regulations' - SANS 10400-A, Clause A19, the 'Approved Competent Person', who was responsible for the on-site inspection of the installation of the prefabricated (nail plated) timber roof trusses, must submit a 'TR2 - Compliance and Completion Certificate' confirming that the fabrication, installation and erection of the entire prefabricated (nail plated) timber roof structure is structurally stable and has been completed in accordance with the approved structural design drawings, to the Principle Structural Engineer (PSE), on completion of the roof truss installation.

Brickwork Notes :

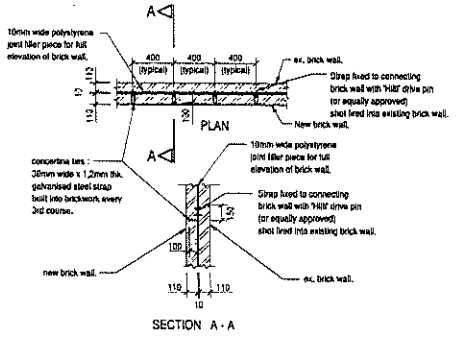
1. All new solid brick walls are110mm wide with brickforce built in every course below surface bed level and every 3rd course above surface bed level with 75mm wide x 2,8mm thk. NHBRC Galvanized Brickforce.
2. All brickwork to be min. 7MPa NFX bricks in Class 3 mortar.

General Notes :

1. All levels and dimensions to be checked on site.
2. This drawing is to be read in conjunction with the Architectural drawings.
3. All concrete work is to comply with SABS 1200G.
4. Concrete Class :-
   a) Strip Footings & Bases = 25 MPa
   b) Surface Bed Slabs = 25 MPa
   c) Blinding = 10 MPa
5. Cover to reinforcement :- As indicated on drawings.
6. All foundation excavations are to be inspected by the Engineer prior to casting of concrete.
7. All reinforcing fixing is to be inspected by the Engineer prior to casting of concrete.
8. Six concrete cubes to be taken per pour. Three cubes to be tested at seven days, the remainder at twenty eight days. The results are to be forwarded to the Engineer for review and approval.
9. All structural concrete is to be cured for a minimum of five days.
10. All load bearing brickwork is to be 7MPa NFX bricks in Class 3 mortar.
11. All concrete plaster and brickwork plaster interfaces to receive V-joints.
12. The Engineer requires 24 hours notice for all inspections.

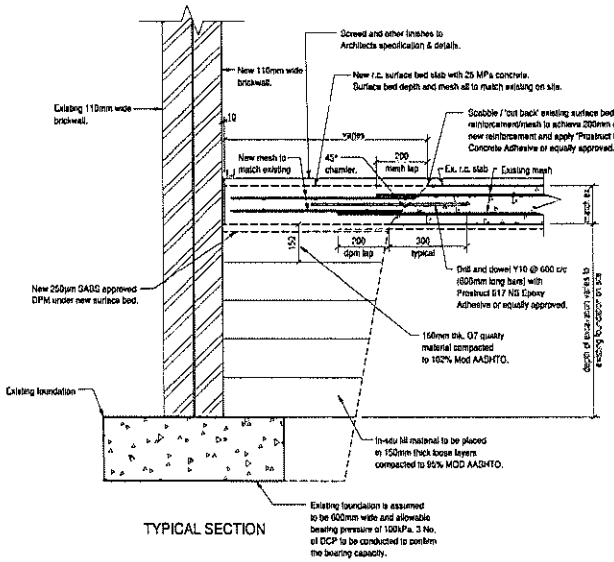


TYPICAL SECTION SHOWING BRICK WALL EXTENSION

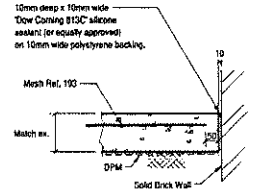


SECTION A - A

NEW BRICKWORK STRAPPING TO EXISTING BRICKWORK (TYPICAL STRAPPING DETAILS FIXED IN ELEVATION)



TYPICAL SECTION



TYPICAL ISOLATION JOINT DETAIL (I.J.)

This drawing is to be read in conjuction with Architect Drw. No.s558/WD-100-7

FOR TENDER

REV	DESCRIPTION	BY	DATE
P3	FOR TENDER	S.N.	19/02/2024
P2	REVISED AS PER REVISION CLOUD	S.N.	15/1/2023
P1	FOR APPROVAL	S.N.	28/06/2023

professional person B.K. RAMAN PrEng registration 20020105

CLIENT

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

PROJECT MANAGERS

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

ARCHITECTS

SAKHISIZWE ARCHITECTS

PROJECT

St. ANDREWS HOSPITAL - ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS

DETAILS

OCCUPATIONAL HEALTH & AUDIOMETRY : FLOOR PLAN STRUCTURAL LAYOUT AND DETAILS

MAP AFRICA
SUITE 106, CEDENVIEW BUILDING, STRATHMORE PARK,
335 MUSGRAVE ROAD, DURBAN, 4001
e-mail : admin@mapafrica.co.za
FAX (031) 3057029 TEL (031) 3095831

DESIGNED	S.N.	COPYRIGHT RESERVED	SCALES 1:50 1:25
DRAWN	S.N.		
APPROVED	S.R.	PL	DATE 28/06/2023

DRAWING No. 545 / 302 REV P3

public works
Department:
Public Works
REPUBLIC OF SOUTH AFRICA

MAP AFRICA
CONSULTING

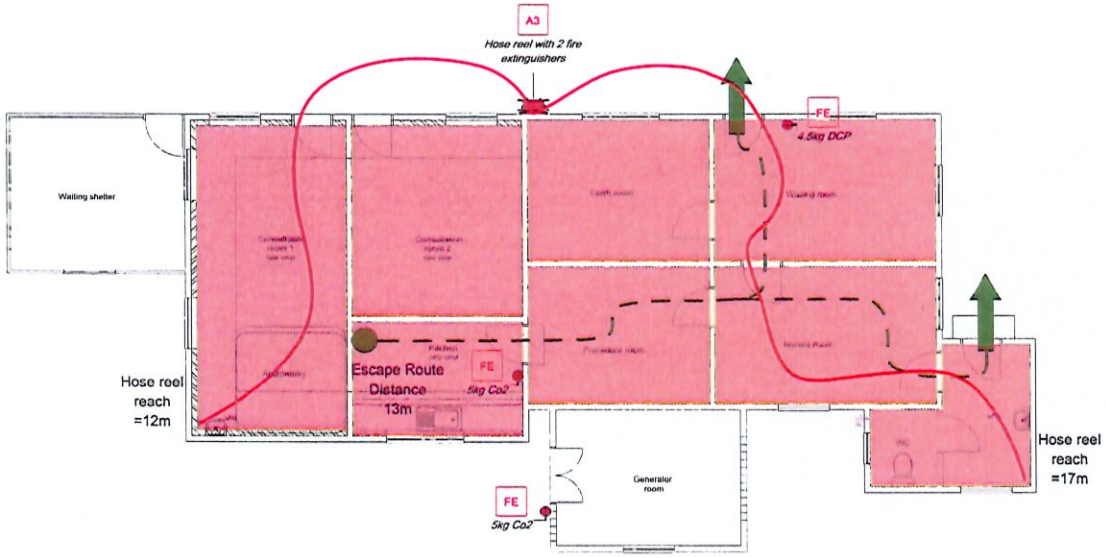
A. METAL ROOF SHEETING

1. Sheeting specification as per Architect's details, supplied in single lengths fixed onto Grade 5 Type SA Pine timber purlins with the 'h' dimension placed vertically. Note : Purlin spacing should not exceed 900mm centres. The use of purlin are as follows :

a. 76 x 50 Grade 5 Type SA Pine timber purlins are only acceptable when truss/rafter spacings do not exceed 1200mm centres.
b. 114 x 50 Grade 5 Type SA Pine timber purlins are only acceptable when truss/rafter spacing is between 1200mm to 1700mm centres.
c. 150 x 50 Grade 5 Type SA Pine timber purlins are only acceptable when truss/rafter spacing is between 1700mm to 2000mm centres.

Colour of the new sheeting to match the roof sheeting on existing blocks or otherwise directed by project Architect.

PROJECT	DETAILS	DATE	REVISION
ST. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS	GENERAL SPECIFICATIONS: REPLACEMENT OF THE TIMBER PURLINS	2023.11.16	P1
		PROJECT No. 545	SKETCH No. SK 01



Occ Health-Audiometry Fire Protection Layout

1 : 100

Hose Reel Combinations:

- A1 : Hose Reel
- A2 : Hose Reel + 1 Extinguisher
- A3 : Hose Reel + 2 Extinguishers
- A4 : Hose Reel + Fire Hydrant
- A5 : Hose Reel + Fire Hydrant + 1 Extinguisher
- A6 : Hose Reel + Fire Hydrant + 2 Extinguishers

Fire Protection:

- Escape Route (Point of Exit)
- Feeder Route
- Escape Route
- 1400 x 900mm Pause Area

Revisions:

Rev	Description	Date	B
A	Issued For Information	03.07.2023	KGM
0	Issued for Tender	21.02.2024	KGM

This drawing is based on Architects drawing No:

DTM
MECHANICAL & ELECTRICAL CONSULTING ENGINEERS

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Project:

St Andrews

Drawing Title:

Occ Health-Audiometry Fire Protection Layout

Checked		Passed
Quality	Design	PR Eng
NH	SS	JLG

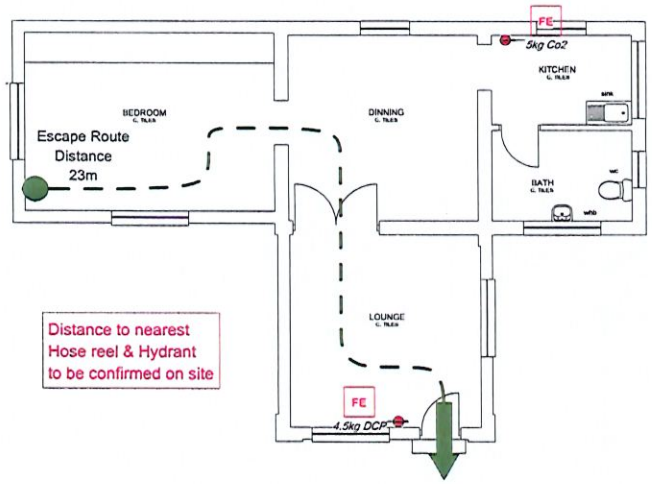
Designed	Drawn	Date	Size	Scale
SS	KGM	06.07.23	A3	1 : 100

Drawing Status :
Issued for Tender

Project Number	Division	Service
211043	F	FP

Drawing Number	Revision
002	0

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21/02/2024 17:19:28



Doctor's House Fire Protection Layout

1 : 100

Hose Reel Combinations:

- A1 : Hose Reel
- A2 : Hose Reel + 1 Extinguisher
- A3 : Hose Reel + 2 Extinguishers
- A4 : Hose Reel + Fire Hydrant
- A5 : Hose Reel + Fire Hydrant + 1 Extinguisher
- A6 : Hose Reel + Fire Hydrant + 2 Extinguishers

Fire Protection:

- Escape Route (Point of Exit)
- Feeder Route
- Escape Route
- 1400 x 900mm Pause Area

Revisions:

Rev	Description	Date	B
A	Issued For Information	03.07.2023	KGM
0	Issued for Tender	21.02.2024	KGM

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Project:

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Drawing Title:

Doctor's House Fire Protection Layout

Checked		Passed
Quality	Design	PR Eng
NH	SS	JLG

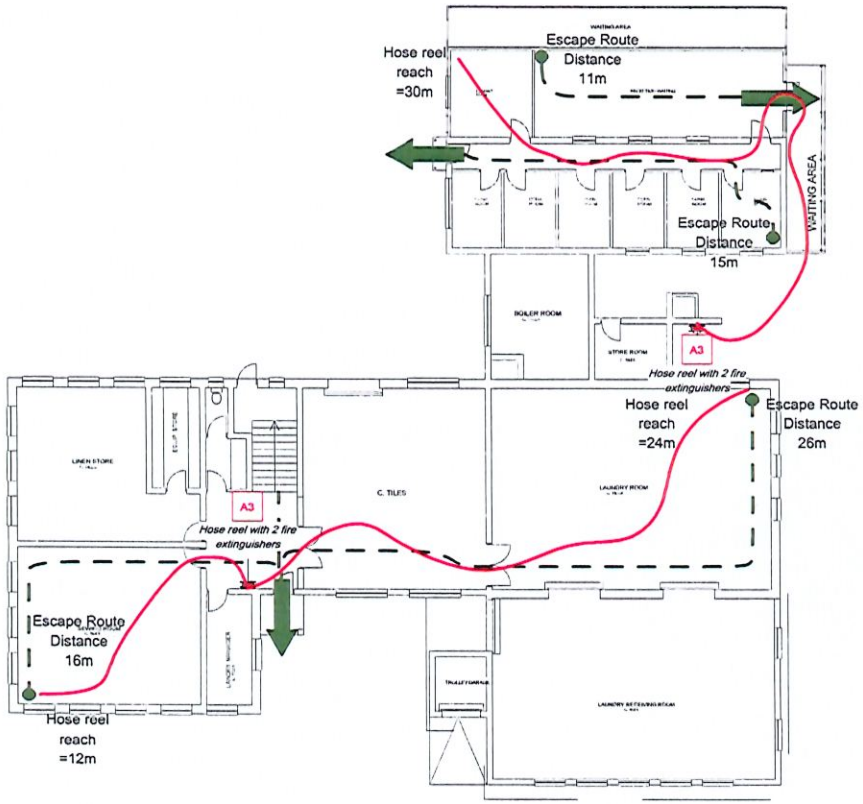
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SS	KGM	06.07.23	A3	1 : 100

Drawing Status :
Issued for Tender

Project Number	Division	Service
211043	F	FP

Drawing Number	Revision
003	0

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21/02/2024 17:19:34



Laundry Ground Floor Fire Protection Layout

1 : 200

Hose Reel Combinations:

- A1 : Hose Reel
- A2 : Hose Reel + 1 Extinguisher
- A3 : Hose Reel + 2 Extinguishers
- A4 : Hose Reel + Fire Hydrant
- A5 : Hose Reel + Fire Hydrant + 1 Extinguisher
- A6 : Hose Reel + Fire Hydrant + 2 Extinguishers

Fire Protection:

- Escape Route (Point of Exit)
- Feeder Route
- Escape Route
- 1400 x 900mm Pause Area

Revisions:

Rev	Description	Date	B
A	Issued For Information	03.07.2023	KGM
0	Issued for Tender	21.02.2024	KGM

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Project:

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Drawing Title:

Laundry Ground Floor Fire Protection Layout

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NH	SS	JLG

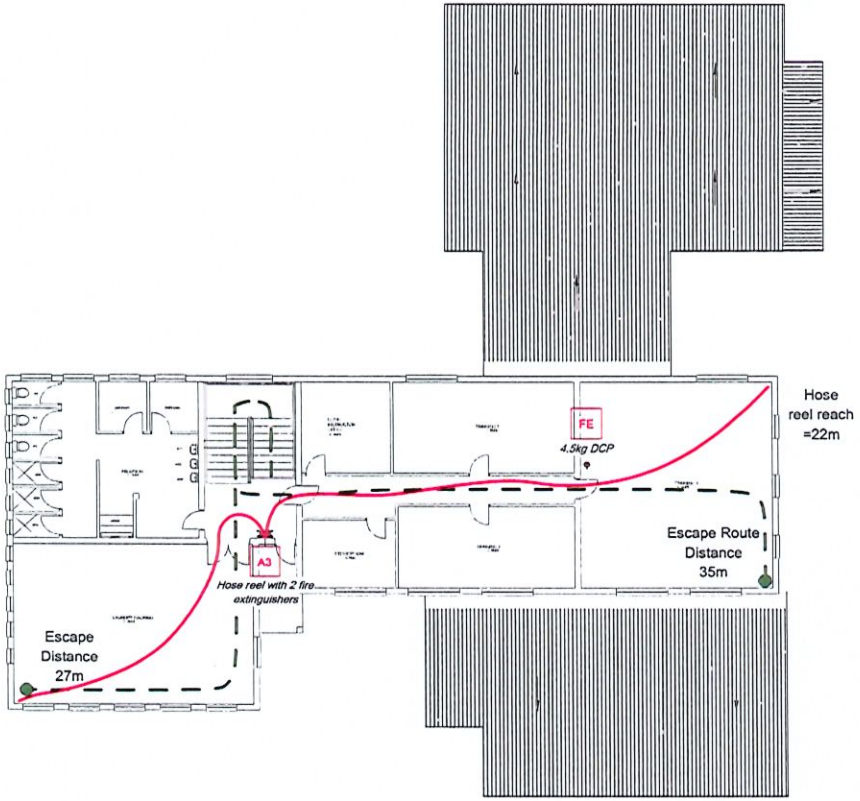
Designed	Drawn	Date	Size	Scale
SS	KGM	06.07.23	A3	As indicated

Drawing Status :
Issued for Tender

Project Number	Division	Service
211043	F	FP

Drawing Number	Revision
004	0

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21/02/2024 17:19:39



Laundry First Floor Fire Protection Layout

1 : 200

Hose Reel Combinations:

- A1 : Hose Reel
- A2 : Hose Reel + 1 Extinguisher
- A3 : Hose Reel + 2 Extinguishers
- A4 : Hose Reel + Fire Hydrant
- A5 : Hose Reel + Fire Hydrant + 1 Extinguisher
- A6 : Hose Reel + Fire Hydrant + 2 Extinguishers

Fire Protection:

- Escape Route (Point of Exit)
- Feeder Route
- Escape Route
- 1400 x 900mm Pause Area

Revisions:

Rev	Description	Date	E
A	Issued For Information	03.07.2023	KGM
0	Issued for Tender	21.02.2024	KGM

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Project:

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Drawing Title:

Laundry First Floor Fire Protection Layout

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Quality	Design	PR Eng
NH	SS	JLG

Designed	Drawn	Date	Size	Scale
SS	KGM	06.07.23	A3	As indicated

Drawing Status :
Issued for Tender

Project Number	Division	Service
211043	F	FP

Drawing Number	Revision
005	0

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21/02/2024 17:19:44



Mortuary building Fire Protection Layout

1 : 100

Hose Reel Combinations:

- A1 : Hose Reel
- A2 : Hose Reel + 1 Extinguisher
- A3 : Hose Reel + 2 Extinguishers
- A4 : Hose Reel + Fire Hydrant
- A5 : Hose Reel + Fire Hydrant + 1 Extinguisher
- A6 : Hose Reel + Fire Hydrant + 2 Extinguishers

Fire Protection:

- Escape Route (Point of Exit)
- Feeder Route
- Escape Route
- 1400 x 900mm Pause Area

Revisions:

Rev	Description	Date	By
A	Issued For Information	03.07.2023	KGM
0	Issued for Tender	21.02.2024	KGM

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Project:

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Drawing Title:

Mortuary building Fire Protection Layout

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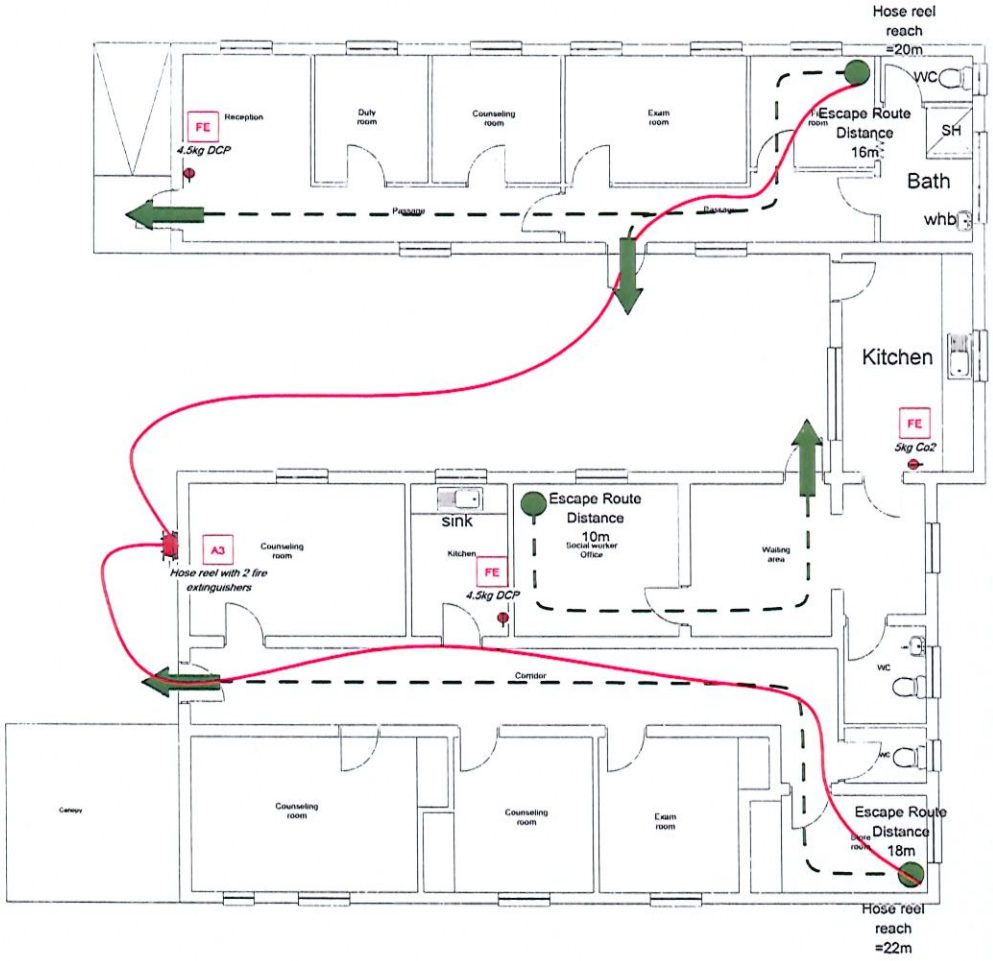
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SS	KGM	06.07.23	A3	1 : 100

Drawing Status :
Issued for Tender

Project Number	Division	Service
211043	F	FP

Drawing Number	Revision
006	0

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21/02/2024 17:19:49



Crisis Centre & Womans Health Floor and Room Fire Protection Layout

1 : 100

Hose Reel Combinations:

- A1 : Hose Reel
- A2 : Hose Reel + 1 Extinguisher
- A3 : Hose Reel + 2 Extinguishers
- A4 : Hose Reel + Fire Hydrant
- A5 : Hose Reel + Fire Hydrant + 1 Extinguisher
- A6 : Hose Reel + Fire Hydrant + 2 Extinguishers

Fire Protection:

- Escape Route (Point of Exit)
- Feeder Route
- Escape Route
- 1400 x 900mm Pause Area

Revisions:

Rev	Description	Date	E
A	Issued For Information	03.07.2023	KGM
0	Issued for Tender	21.02.2024	KGM

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Project:

St Andrews

Drawing Title:

Crisis Centre & Womans Health Floor and Room Fire Protection Layout

Checked		Passed
Quality	Design	PR Eng
NH	SS	JLG

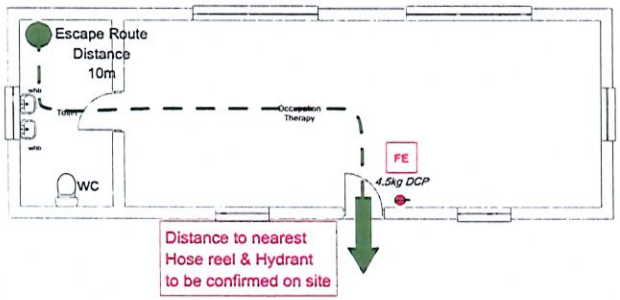
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Drawing Status :
Issued for Tender

Project Number	Division	Service
211043	F	FP

Drawing Number	Revision
007	0

K:\02 DTM\2021\211043A - St Andrews\Fire\Revit Models\211043A - St Andrews (FIRE)_V23.rvt
21/02/2024 17:19:55



Occupation Therapy Fire Protection Layout

1 : 100

Hose Reel Combinations:

- A1 : Hose Reel
- A2 : Hose Reel + 1 Extinguisher
- A3 : Hose Reel + 2 Extinguishers
- A4 : Hose Reel + Fire Hydrant
- A5 : Hose Reel + Fire Hydrant + 1 Extinguisher
- A6 : Hose Reel + Fire Hydrant + 2 Extinguishers

Fire Protection:

- Escape Route (Point of Exit)
- Feeder Route
- Escape Route
- 1400 x 900mm Pause Area

Revisions:

Rev	Description	Date	By
A	Issued For Information	03.07.2023	KGM
0	Issued for Tender	21.02.2024	KGM

This drawing is based on Architects drawing No:

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Project:

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Drawing Title:

Occupation therapy Fire Protection Layout

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Quality	Design	PR Eng
NH	SS	JLG

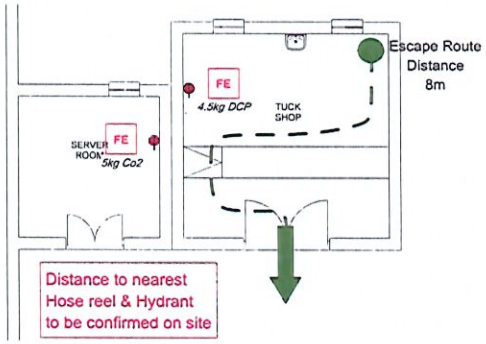
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Project Number	Division	Service
211043	F	FP

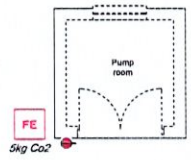
Drawing Number	Revision
008	0

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21/02/2024 17:20:00



Tuckshop Fire Protection Layout

1 : 100



Pumproom Fire Protection Layout

1 : 100

Hose Reel Combinations:

- A1 : Hose Reel
- A2 : Hose Reel + 1 Extinguisher
- A3 : Hose Reel + 2 Extinguishers
- A4 : Hose Reel + Fire Hydrant
- A5 : Hose Reel + Fire Hydrant + 1 Extinguisher
- A6 : Hose Reel + Fire Hydrant + 2 Extinguishers

Fire Protection:

- Escape Route (Point of Exit)
- Feeder Route
- Escape Route
- 1400 x 900mm Pause Area

Revisions:

Rev	Description	Date	E
A	Issued For Information	03.07.2023	KGM
0	Issued for Tender	21.02.2024	KGM

This drawing is based on Architects drawing No:

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Project:

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Drawing Title:

Tuckshop & Pumproom Fire Protection Layout

Checked		Passed
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NH	SS	JLG

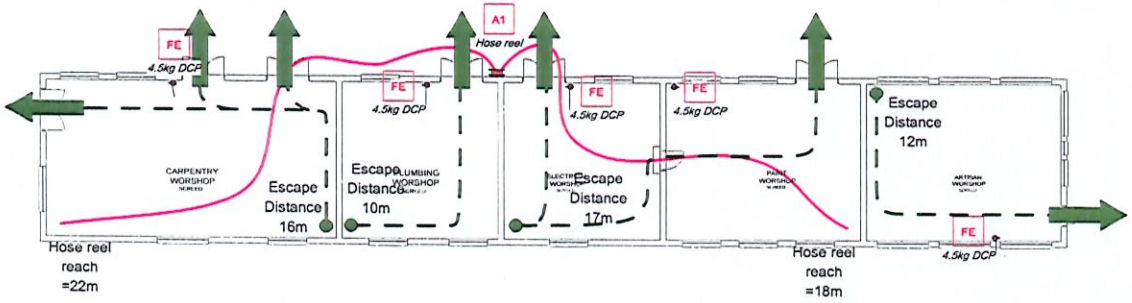
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Drawing Status :
Issued for Tender

Project Number	Division	Service
211043	F	FP

Drawing Number	Revision
009	0

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21/02/2024 17:20:05



Workshops Fire Protection Layout

1 : 200

Hose Reel Combinations:

- A1 : Hose Reel
- A2 : Hose Reel + 1 Extinguisher
- A3 : Hose Reel + 2 Extinguishers
- A4 : Hose Reel + Fire Hydrant
- A5 : Hose Reel + Fire Hydrant + 1 Extinguisher
- A6 : Hose Reel + Fire Hydrant + 2 Extinguishers

Fire Protection:

- Escape Route (Point of Exit)
- Feeder Route
- Escape Route
- 1400 x 900mm Pause Area

Revisions:

Rev	Description	Date	By
A	Issued For Information	03.07.2023	KGM
0	Issued for Tender	21.02.2024	KGM

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Project:

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Drawing Title:

Workshops Fire Protection Layout

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Quality	Design	PR Eng
NH	SS	JLG

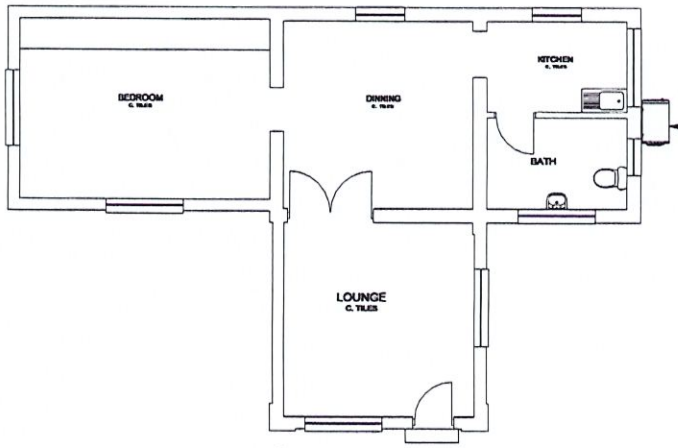
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Drawing Status :
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Project Number	Division	Service
211043	F	FP

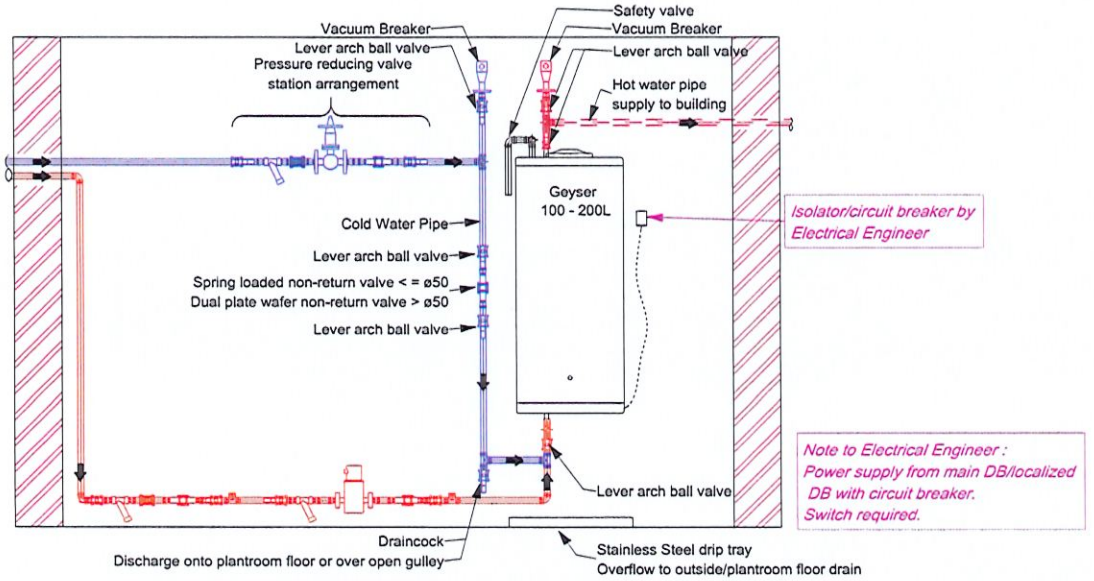
Drawing Number	Revision
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21/02/2024 17:20:10



Doctor's House

1 : 100



Note:
- All components to have dezincification resistant alloy/brass body and minimum PN 16 rating
- All components to include additional male/female brass connectors, bushes and couplings for multilayer piping
- 100 - 200L geyser can be vertically wall mounted
- 100 - 250L geyser can be Horizontally floor mounted
- Thermal insolation blanket recommended for covered installations

General Geyser Arrangement

Water Detail - General Geyser Arrangement

1 : 25

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Revisions:

Rev	Description	Date	B.

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Project:

St Andrews

Drawing Title:

Doctor's House

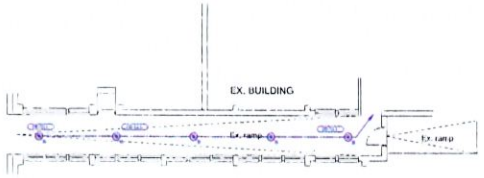
Checked		Passed
Quality	Design	PR Eng
AVN	SS	JLG

Designed	Drawn	Date	Size	Scale
SS	KGM	04/06/23	A3	As indicated

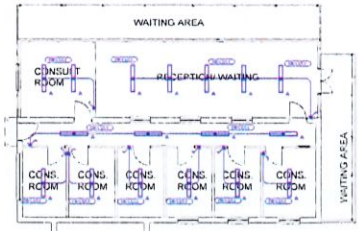
Drawing Status :

Project Number	Division	Service
211043	M	WS

Drawing Number	Revision
003	



FLOOR PLAN (WALKWAY LABORATORY)
SCALE 1:100

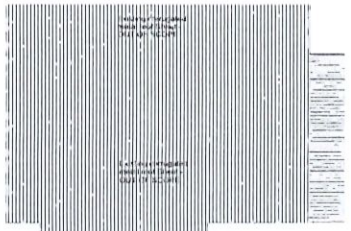


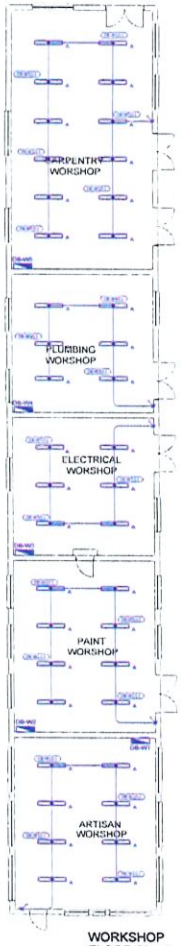


PUMP ROOM
FLOOR PLAN
SCALE 1:100

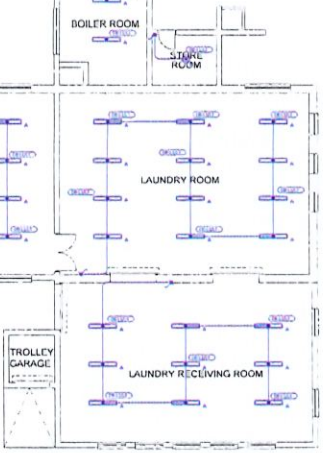


TUCKSHOP
FLOOR PLAN
SCALE 1:100

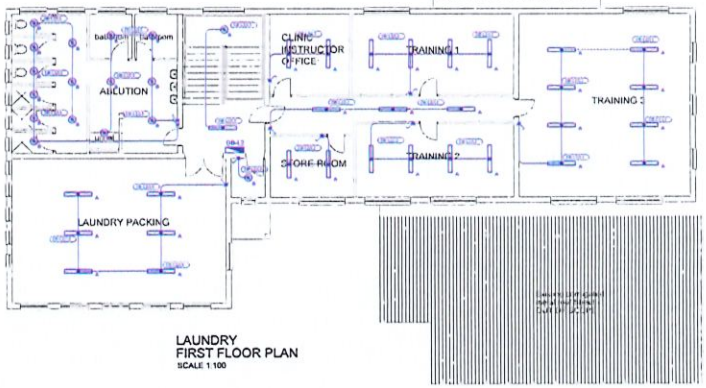




WORKSHOP
FLOOR PLAN
SCALE 1:100



LAUNDRY
GROUND FLOOR PLAN
SCALE 1:100



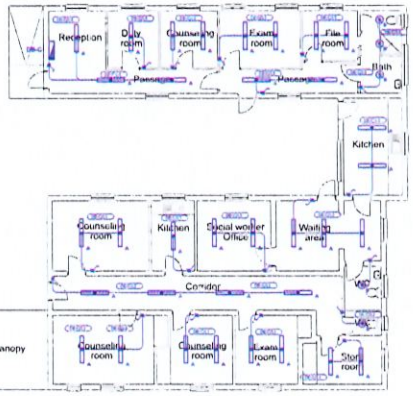
LAUNDRY
FIRST FLOOR PLAN
SCALE 1:100



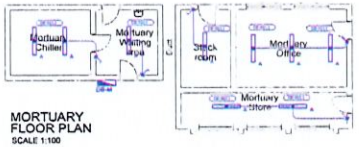
OCC. HEALTH - AUDOMETRY
FLOOR PLAN
SCALE 1:100



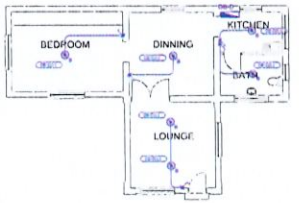
OCCUPATIONAL THERAPY
FLOOR PLAN
SCALE 1:100



CRISIS CENTRE & WOMENS HEALTH
FLOOR PLAN
SCALE 1:100



MORTUARY
FLOOR PLAN
SCALE 1:100



DOCTORS HOUSE
FLOOR PLAN
SCALE 1:100

GENERAL NOTES

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Do not scale this drawing.

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Notwithstanding anything to the contrary, all / no part of this drawing may be reproduced in any form (including photo-copying or storage in any medium by electronic means and whether or not transiently or incidentally to some other use of this drawing). In addition, this drawing may not be used for any purpose or reason other than for which it was originally issued, without written permission of the author.

DRAWING NOTES

Light Fitting Types:

Type A - LED Linear vapour proof fitting (IP65), with poly carbonate UV protected diffuser and stainless clips. (160 - 180 lumens per watt and CRI 80+). Complete with 5 year warrantee.

Type B - Surface mounted IP65 high pressure die cast aluminum bulkhead fitting with high impact polycarbonate diffuser and black trim. (127 lumens per watt and CRI 80+). Complete with 5 year warrantee.

A	29/03/13	AR	Original Issue

IBUTA Engineers

Client/Address
St Andrews Hospital Asbestos Erad & Roof Works

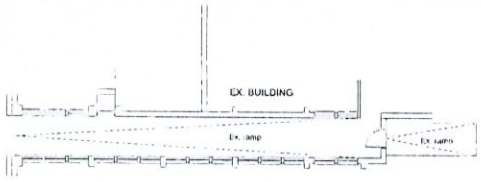
Title
Electrical Installation

Sub
Lighting Layouts

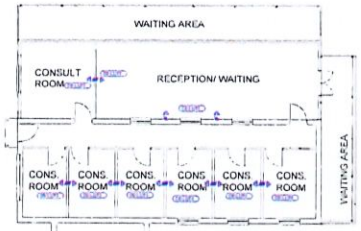
Surveyed	Drawn by	Date	Checked	Scale
SM	AR	Feb '24	SM	1:100

Project No	Drawing No	Sheet	Issue
22015	100		0

NOTES: (1) = Contractor to ensure max distance between drive boxes 25 metres notwithstanding anything to contrary. (2) = Drive boxes inspected after every second 90 deg. bend or 180 deg. total of drive bends. (3) = All universal conduits to be provided with draw wires. These will be withdrawn and checked at random. (4) = Cast in conduits to be spaced 15mm. maximum.



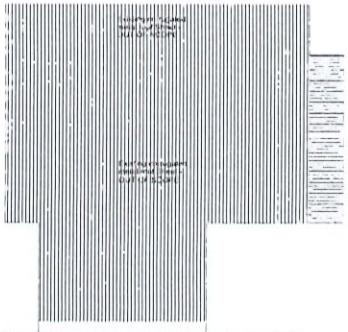
FLOOR PLAN (WALKWAY LABORATORY)
SCALE 1:100





PUMP ROOM
FLOOR PLAN
SCALE 1:100

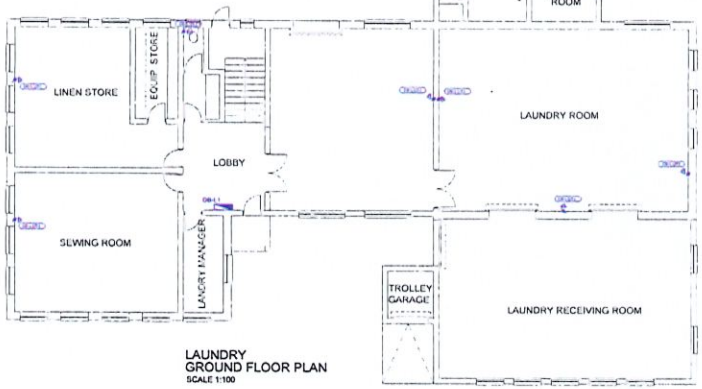




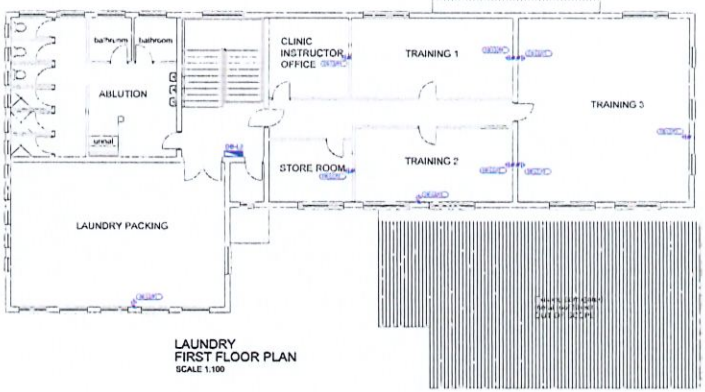
TUCKSHOP
FLOOR PLAN
SCALE 1:100



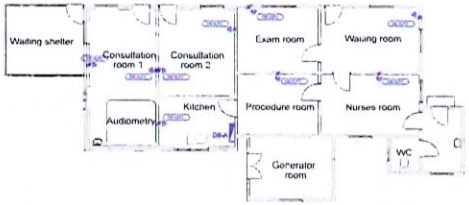
WORKSHOP
FLOOR PLAN
SCALE 1:100



LAUNDRY
GROUND FLOOR PLAN
SCALE 1:100



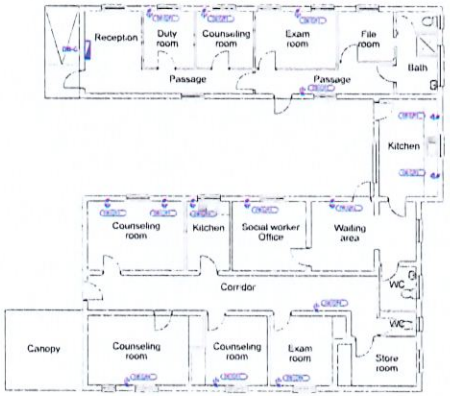
LAUNDRY
FIRST FLOOR PLAN
SCALE 1:100



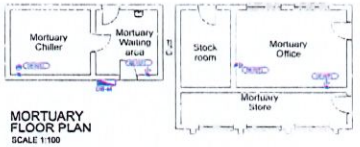
OCC. HEALTH - AUDOMETRY
FLOOR PLAN
SCALE 1:100



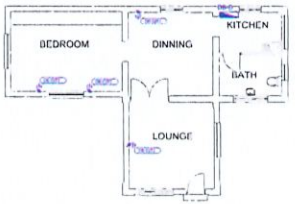
OCCUPATIONAL THERAPY
FLOOR PLAN
SCALE 1:100



CRISIS CENTRE & WOMENS HEALTH
FLOOR PLAN
SCALE 1:100



MORTUARY
FLOOR PLAN
SCALE 1:100



DOCTORS HOUSE
FLOOR PLAN
SCALE 1:100

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DRAWING NOTES

A	28/03/22	AB	Original Issue

REVISIONS

IBUA Consulting Engineers

PROJECT/ADDRESS
St Andrews Hospital Asbestos Erad & Roof Works

Electrical Installation

TITLE
Small Power Layouts

DRAWN	DRAWN BY	DATE	CHECKED	SCALE
NB	AB	Feb '22	SM	1:100 @ A1 1:200 @ A3

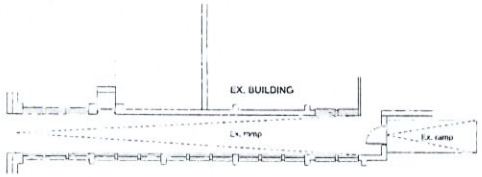
PROJECT No.	DRAWING No.	SHEET	REV
22015	200		0

NOTES: (1) = Contractor to ensure that distance between drive boxes 20 metres, notwithstanding anything to contrary.

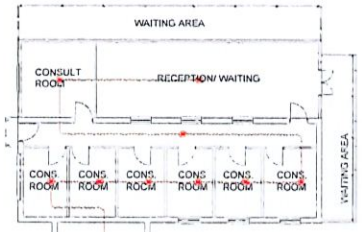
(2) = Drive boxes required after every second 90 deg. bend or 15m deg. total or drive boxes.

(3) = All powered consultants to be provided with drive extras. These will be scrutinised and checked at random.

(4) = Cost in conduits to be exposed 25mm. minimum.



FLOOR PLAN (WALKWAY LABORATORY)
SCALE 1:100

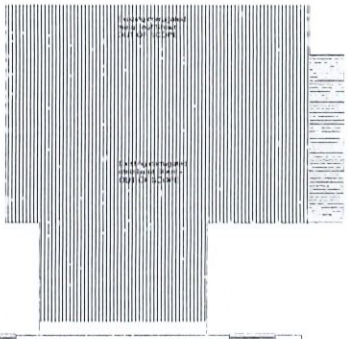


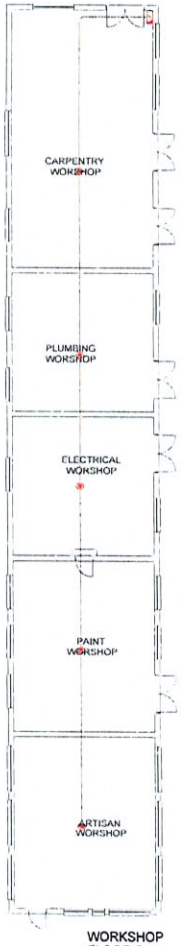


PUMP ROOM
FLOOR PLAN
SCALE 1:100

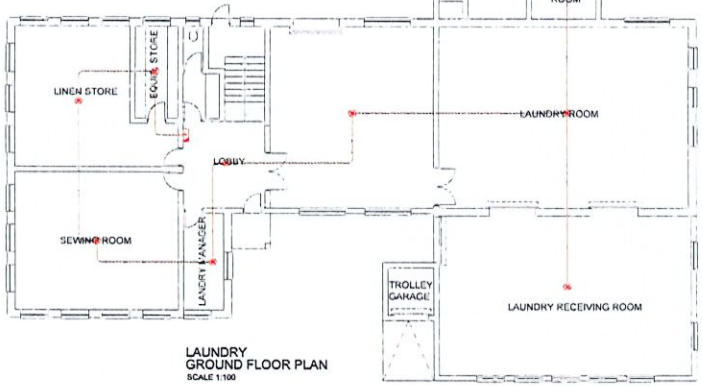


TUCKSHOP
FLOOR PLAN
SCALE 1:100

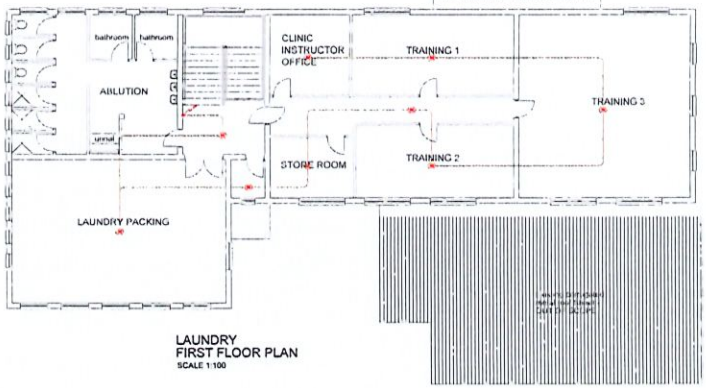




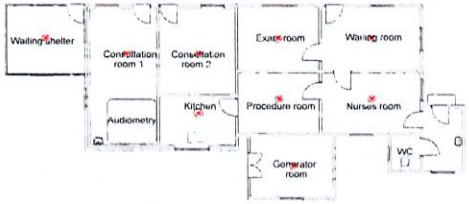
WORKSHOP
FLOOR PLAN
SCALE 1:100



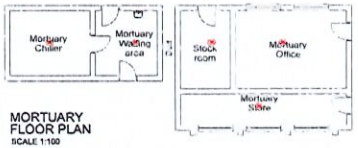
LAUNDRY
GROUND FLOOR PLAN
SCALE 1:100



LAUNDRY
FIRST FLOOR PLAN
SCALE 1:100



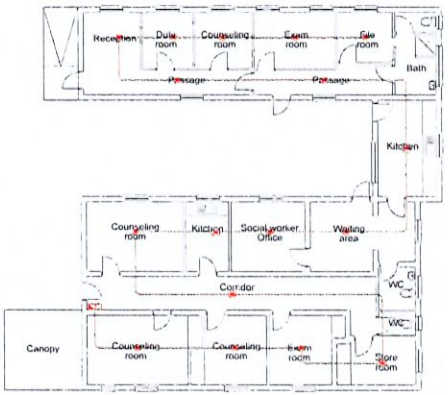
OCC. HEALTH - AUDOMETRY
FLOOR PLAN
SCALE 1:100



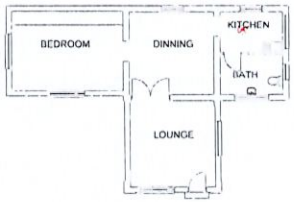
MORTUARY
FLOOR PLAN
SCALE 1:100



OCCUPATIONAL THERAPY
FLOOR PLAN
SCALE 1:100



CRISIS CENTRE & WOMENS HEALTH
FLOOR PLAN
SCALE 1:100



DOCTORS HOUSE
FLOOR PLAN
SCALE 1:100

GENERAL NOTES

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DRAWING NOTES

X	29/9/23	AR	Original Issue

IBUKA Consulting Engineers

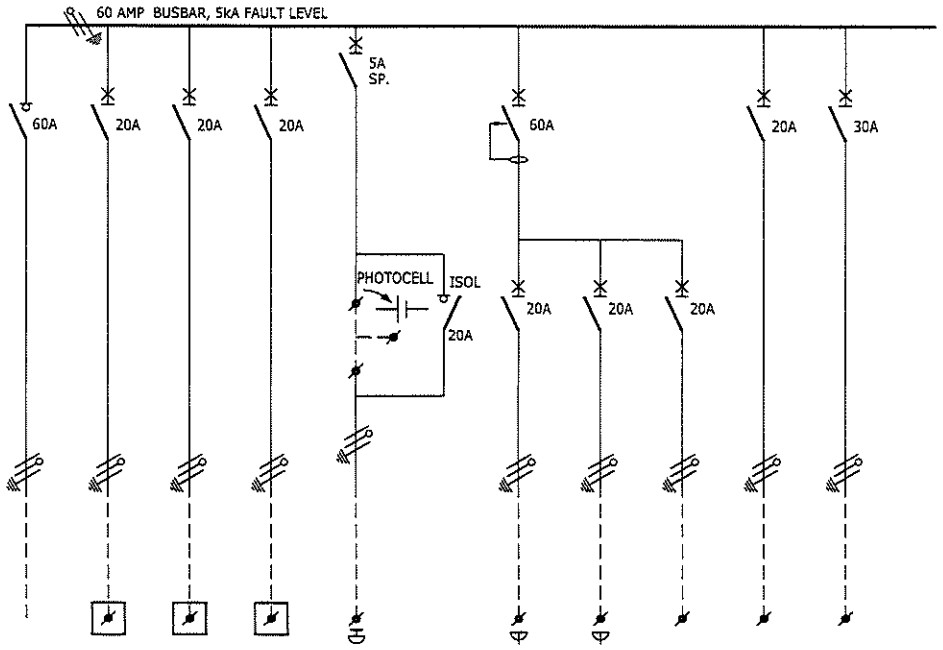
Client: St Andrews Hospital Asbestos Erad & Roof Works

Title: Electrical Installation

Sheet: Smoke Detection Layouts

Started by	Drawn by	Date	Checked	Scale
NR	AR	Feb '24	NR	1:100

Project No.	Drawing No.	Issue	Rev.
22015	300		0



PHASE
CIRCUIT No.

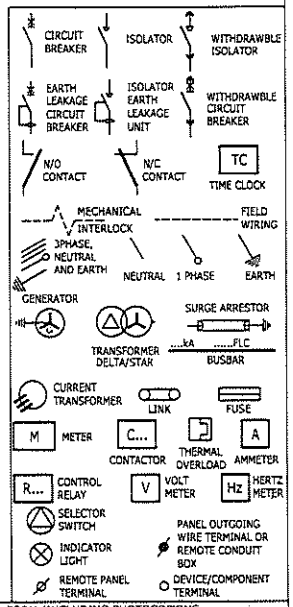
DESIGNATION	WIRING	LOAD (AMPS) No. OF POINTS
INCOMER	10mm² 2CORE Cu PVC SWA PVC ECC CABLE	
LIGHTING	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	
LIGHTING	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	
LIGHTING	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	
OUTDOOR LIGHTS	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	
SSOs	3x2,5mm² PVC INSULATED WIRE	
SSOs	3x2,5mm² PVC INSULATED WIRE	
SPARE		
SPARE		
SPARE		

GENERAL NOTES:

A) DROPPERS/TAILS TO BE RATED FOR I^2t LET THROUGH
B) HARNESSED WIRING TO BE DERATED.
C) TUFFNOL BRACES NOT TO BE USED ABOVE 10kA.
D) COPPER BUSBARS TO BE CONTINUOUS RATED.
E) ENCLOSURE TO BE IP54.
F) PHASING R.W.B. TOP TO BOTTOM, LEFT TO RIGHT, BACK TO FRONT.
G) INTERNAL TEMPERATURE TO BE LIMITED TO 5° ABOVE ABOVE AMBIENT - MAX. 40°C.
H) CABLE ENTRIES AND GENERAL ARRANGEMENT TO SUIT INSTALLATION CONSTRAINTS.

ADDITIONAL NOTES:

1. ALL CIRCUIT BREAKERS, ISOLATORS AND EARTH LEAKAGE TO BE TYPE 2 CURVE AND EQUIPMENT TO BE CBI.
2. EARTH LEAKAGE TO BE 60A ISOLATOR WITH INTEGRAL 30mA.
3. RECESSED MOUNTED DB WITH ARCHITRAVE.
4. DB COLOUR TO BE WHITE.
5. DB TO BE TOP AND BOTTOM ENTRY
6. BUSBAR TO BE SHROUDED
7. EARTH & NEUTRAL BAR TO BE EASY ACCESSIBLE.
8. SUFFICIENT SPACE REQUIRED FOR SAFE ACCESS FOR REWIRNG.
9. ACCESS ZONE REQUIRED THROUGH SHROUD
10. ALL SINGLE PHASE OUTGOING CIRCUIT BREAKERS TO BE LABELLED WITH DESCRIPTION OF SERVICES AND CIRCUIT Nos. AS PER DRAWING.



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REV	DESCRIPTION	BY	DATE	CHKD.
0	Original Issue	CG	18/3/24	

ENGINEER: S.Nzama | DRAWN: CG | DATE: March 24 | SCALE: n.t.s | PAPER SIZE: A3 | CHKD.

PROJECT No.: 22015 | DRAWING No.: 401 | SHEET: 1 of 1 | REV.: O

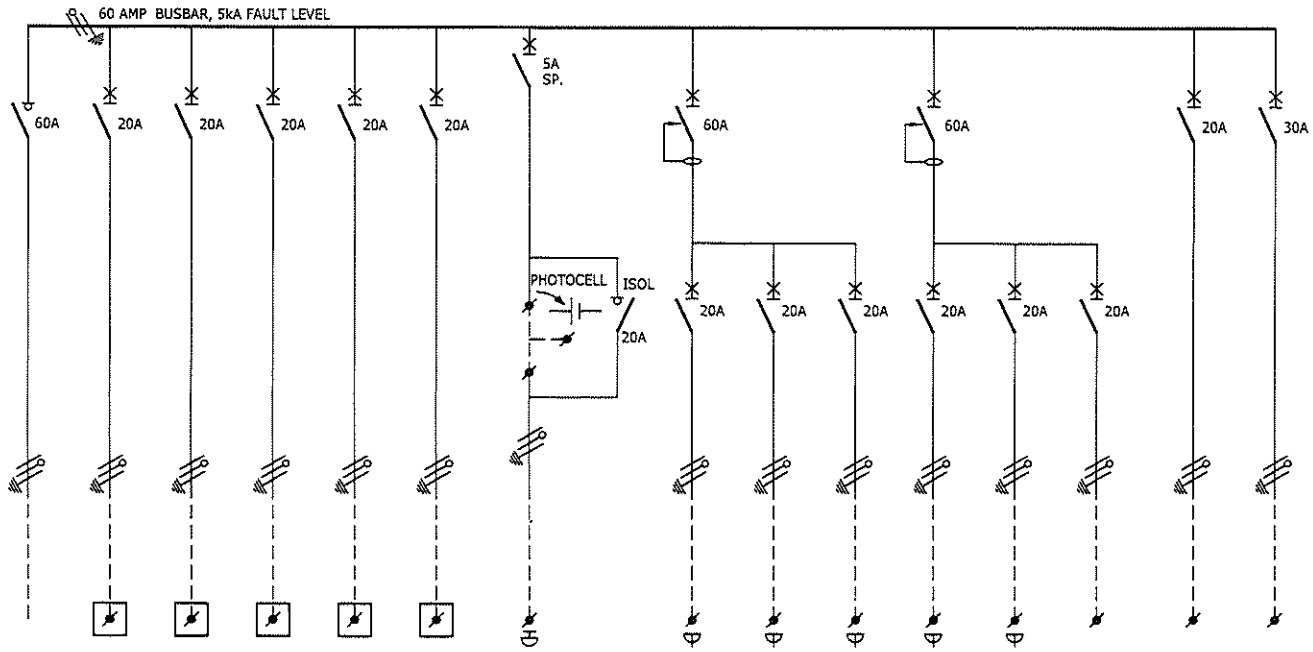
File Name : Lyr:0:1:A3

TITLE: St Andrews Hospital Asbestos Erad & Roof Works Electrical Installation

DRAWING TITLE: DB-A

Single Line Diagram

IBUYA Consulting Engineers
"POWERING DEVELOPMENT"
BLOCK D
ESSEX PARK
46 ESSEX TERRACE
WESTVILLE
P.O. BOX 1692
WANDSBECK 3631
TEL: +27 (031) 2667332
FAX: +27 (031) 2667340
E-mail: ibuya@ibuya.co.za



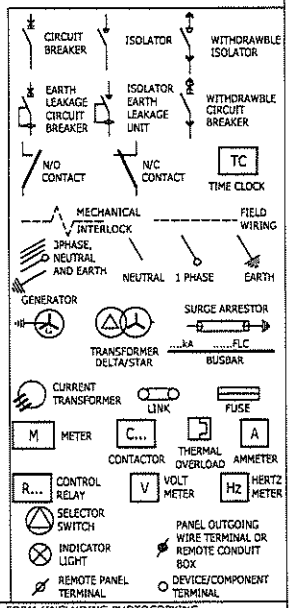
GENERAL NOTES:

A) DROPPERS/TAILS TO BE RATED FOR ± LET THROUGH
B) HARNESSED WIRING TO BE DERATED.
C) TUFFNOL BRACES NOT TO BE USED ABOVE 10kA.
D) COPPER BUSBARS TO BE CONTINUOUS RATED.
E) ENCLOSURE TO BE IP54.
F) PHASING R.W.B. TOP TO BOTTOM, LEFT TO RIGHT, BACK TO FRONT.
G) INTERNAL TEMPERATURE TO BE LIMITED TO 5° ABOVE ABOVE AMBIENT - MAX. 40°C.
H) CABLE ENTRIES AND GENERAL ARRANGEMENT TO SUIT INSTALLATION CONSTRAINTS.

ADDITIONAL NOTES:

1. ALL CIRCUIT BREAKERS, ISOLATORS AND EARTH LEAKAGE TO BE TYPE 2 CURVE AND EQUIPMENT TO BE CBI.
2. EARTH LEAKAGE TO BE 60A ISOLATOR WITH INTEGRAL 30mA.
3. RECESSED MOUNTED DB WITH ARCHITRAVE.
4. DB COLOUR TO BE WHITE.
5. DB TO BE TOP AND BOTTOM ENTRY
6. BUSBAR TO BE SHROUDED
7. EARTH & NEUTRAL BAR TO BE EASY ACCESSIBLE.
8. SUFFICIENT SPACE REQUIRED FOR SAFE ACCESS FOR REWIRNG.
9. ACCESS ZONE REQUIRED THROUGH SHROUD
10. ALL SINGLE PHASE OUTGOING CIRCUIT BREAKERS TO BE LABELLED WITH DESCRIPTION OF SERVICES AND CIRCUIT Nos. AS PER DRAWING.

	L1	L2	L3	L4	L5	L6	P1	P2	P3	P4	P5	P6
PHASE CIRCUIT No.												
DESIGNATION	INCOMER	LIGHTING	LIGHTING	LIGHTING	LIGHTING	LIGHTING	OUTDOOR LIGHTS	SSOs	SSOs	SSOs	SSOs	SSOs	SPARE	SPARE	SPARE
WIRING	10mm² 2CORE Cu PVC SWA PVC ECC CABLE	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	3x2,5mm² PVC INSULATED WIRE	3x2,5mm² PVC INSULATED WIRE	3x2,5mm² PVC INSULATED WIRE	3x2,5mm² PVC INSULATED WIRE	3x2,5mm² PVC INSULATED WIRE			
LOAD (AMPS) No. OF POINTS															



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REV	DESCRIPTION	BY	DATE	CHKD.
0	Original Issue	CG	18/3/24	

ENGINEER	DRAWN	DATE:	SCALE:	CHKD.
S.Nzama	CG	March 24	n.t.s	
			PAPER SIZE: A3	

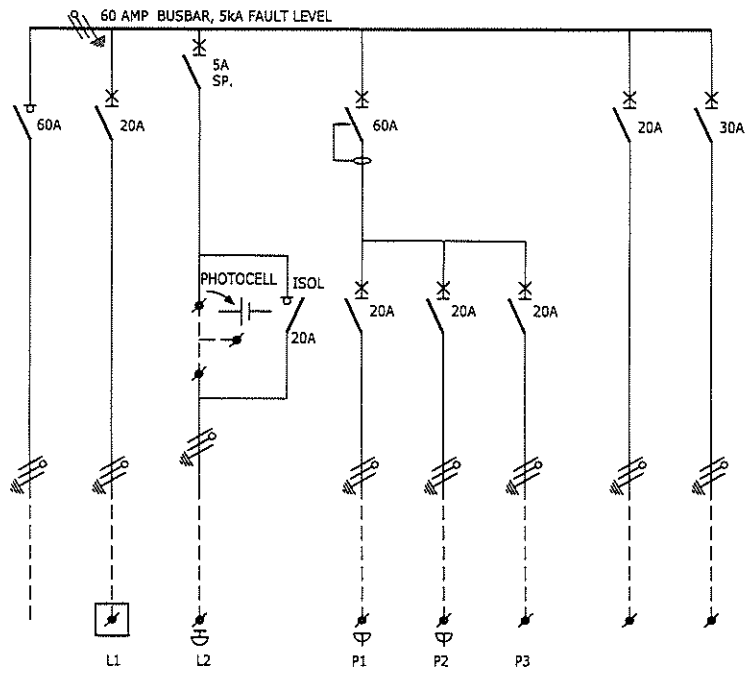
PROJECT No.	DRAWING No.	SHEET:	REV.
22015	402	1 of 1	O

File Name : Lyr:D:1:A3

TITLE
St Andrews Hospital Asbestos Erad & Roof Works Electrical Installation

DRAWING TITLE:
DB-C
Single Line Diagram

IBUYA Consulting Engineers
"POWERING DEVELOPMENT"
BLOCK D
ESSEX PARK
46 ESSEX TERRACE
WESTVILLE
P.O. BOX 1692
WANDSBECK 3631
TEL: +27 (031) 2667332
FAX: +27 (031) 2667340
E-mail: ibuya@ibuya.co.za



PHASE
CIRCUIT No.

DESIGNATION

INCOMER	LIGHTING	OUTDOOR LIGHTS		SSOs	SSOs	SPARE	SPARE	SPARE

WIRING

10mm² 2CORE Cu PVC SWA PVC ECC CABLE	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE		3x2,5mm² PVC INSULATED WIRE	3x2,5mm² PVC INSULATED WIRE			

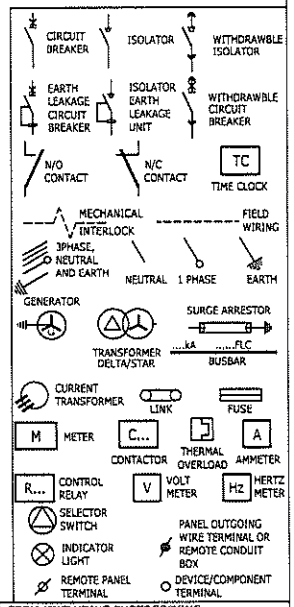
LOAD (AMPS)
No. OF POINTS

GENERAL NOTES:

A) DROPPERS/TAILS TO BE RATED FOR t LET THROUGH
B) HARNESSED WIRING TO BE DERATED.
C) TUFFNOL BRACES NOT TO BE USED ABOVE 10kA.
D) COPPER BUSBARS TO BE CONTINUOUS RATED.
E) ENCLOSURE TO BE IP54.
F) PHASING R.W.B. TOP TO BOTTOM, LEFT TO RIGHT, BACK TO FRONT.
G) INTERNAL TEMPERATURE TO BE LIMITED TO 5° ABOVE ABOVE AMBIENT - MAX. 40°C.
H) CABLE ENTRIES AND GENERAL ARRANGEMENT TO SUIT INSTALLATION CONSTRAINTS.

ADDITIONAL NOTES:

1. ALL CIRCUIT BREAKERS, ISOLATORS AND EARTH LEAKAGE TO BE TYPE 2 CURVE AND EQUIPMENT TO BE CBI.
2. EARTH LEAKAGE TO BE 60A ISOLATOR WITH INTEGRAL 30mA.
3. RECESSED MOUNTED DB WITH ARCHITRAVE.
4. DB COLOUR TO BE WHITE.
5. DB TO BE TOP AND BOTTOM ENTRY
6. BUSBAR TO BE SHROUDED
7. EARTH & NEUTRAL BAR TO BE EASY ACCESSIBLE.
8. SUFFICIENT SPACE REQUIRED FOR SAFE ACCESS FOR REWIRNG.
9. ACCESS ZONE REQUIRED THROUGH SHROUD
10. ALL SINGLE PHASE OUTGOING CIRCUIT BREAKERS TO BE LABELLED WITH DESCRIPTION OF SERVICES AND CIRCUIT Nos. AS PER DRAWING.



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REV	DESCRIPTION	BY	DATE	CHKD.
0	Original Issue	CG	18/3/24	

ENGINEER	DRAWN	DATE:	SCALE:	CHKD.
S.Nzama	CG	March 24	n.t.s PAPER SIZE: A3	

PROJECT No.	DRAWING No.	SHEET:	REV.
22015	403	1 of 1	O

File Name : Lyr:0:1:A3

TITLE
St Andrews Hospital Asbestos Erad & Roof Works
Electrical Installation

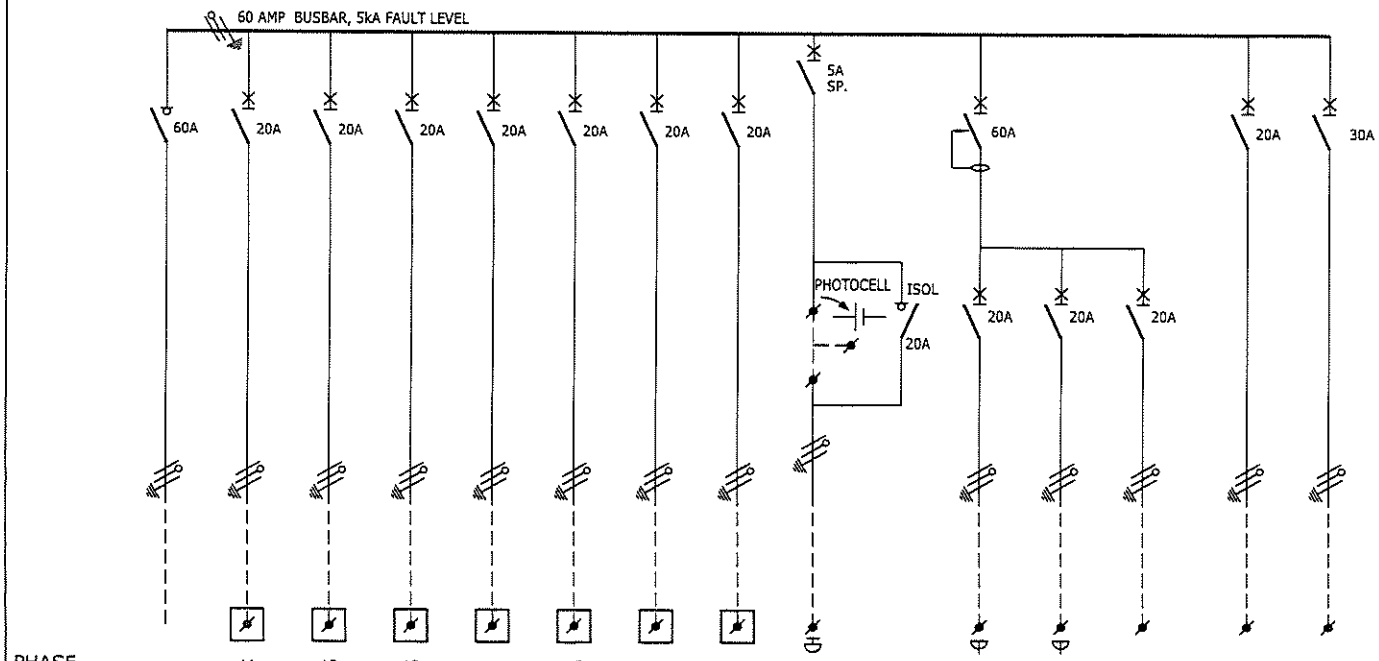
DRAWING TITLE:
DB-D

Single Line Diagram

IBUYA Consulting Engineers
"POWERING DEVELOPMENT"

BLOCK D
ESSEX PARK
46 ESSEX TERRACE
WESTVILLE
P.O. BOX 1692
WANDSBECK 3631

TEL: +27 (031) 2667332
FAX: +27 (031) 2667340
E-mail: ibuya@ibuya.co.za

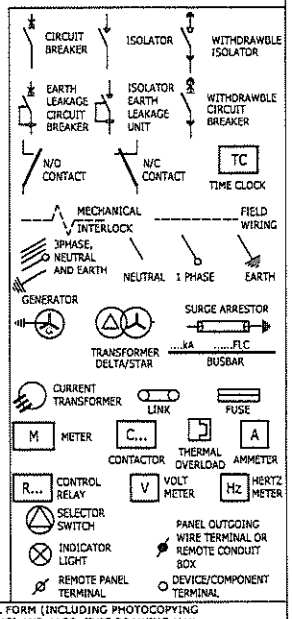


GENERAL NOTES:

A) DROPPERS/TAILS TO BE RATED FOR t LET THROUGH
B) HARNESSED WIRING TO BE DERATED.
C) TUFFNOL BRACES NOT TO BE USED ABOVE 10kA.
D) COPPER BUSBARS TO BE CONTINUOUS RATED.
E) ENCLOSURE TO BE IP54.
F) PHASING R.W.B. TOP TO BOTTOM, LEFT TO RIGHT, BACK TO FRONT.
G) INTERNAL TEMPERATURE TO BE LIMITED TO 5° ABOVE ABOVE AMBIENT - MAX. 40°C.
H) CABLE ENTRIES AND GENERAL ARRANGEMENT TO SUIT INSTALLATION CONSTRAINTS.

ADDITIONAL NOTES:

1. ALL CIRCUIT BREAKERS, ISOLATORS AND EARTH LEAKAGE TO BE TYPE 2 CURVE AND EQUIPMENT TO BE CBI.
2. EARTH LEAKAGE TO BE 60A ISOLATOR WITH INTEGRAL 30mA.
3. RECESSED MOUNTED DB WITH ARCHITRAVE.
4. DB COLOUR TO BE WHITE.
5. DB TO BE TOP AND BOTTOM ENTRY
6. BUSBAR TO BE SHROUDED
7. EARTH & NEUTRAL BAR TO BE EASY ACCESSIBLE.
8. SUFFICIENT SPACE REQUIRED FOR SAFE ACCESS FOR REWIRNG.
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REV	DESCRIPTION	BY	DATE	CHKD.
0	Original Issue	CG	18/3/24	

ENGINEER	DRAWN	DATE:	SCALE:	CHKD.
S.Nzama	CG	March 24	n.t.s PAPER SIZE: A3	

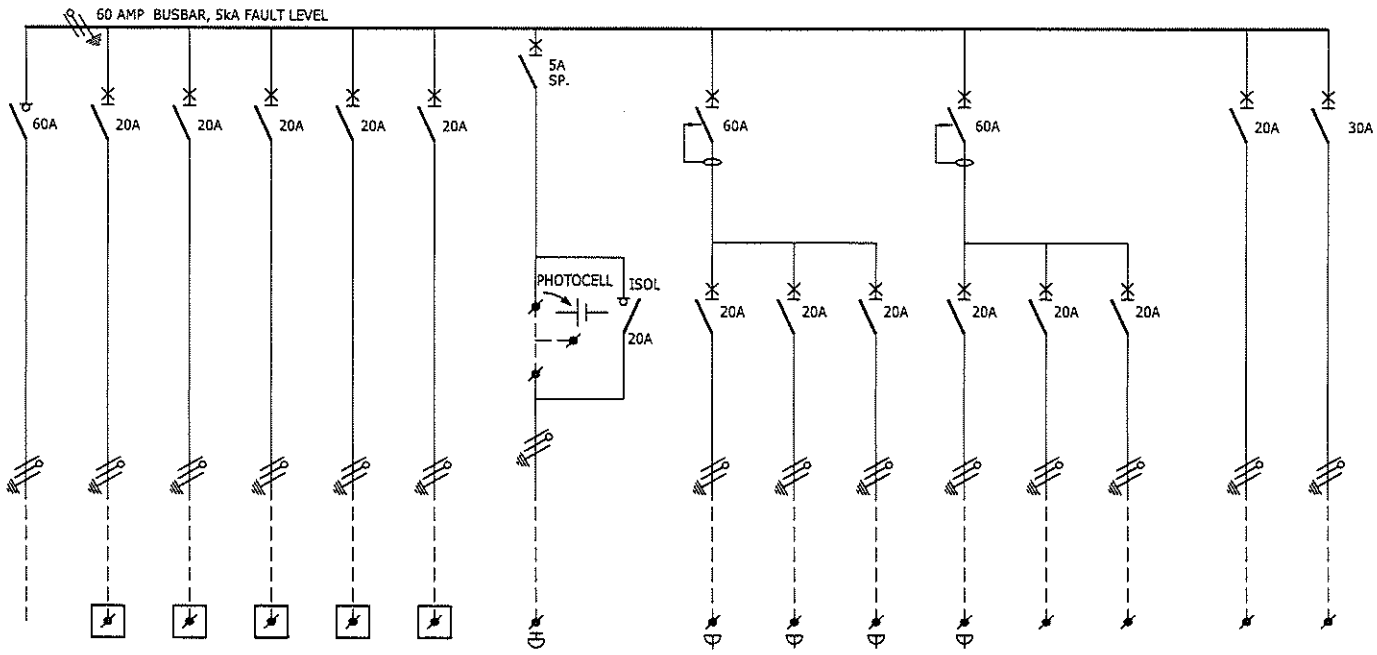
PROJECT No.	DRAWING No.	SHEET:	REV.
22015	404	1 of 1	0

File Name : Lyr:0:1:A3

TITLE
St Andrews Hospital Asbestos Erad & Roof Works Electrical Installation

DRAWING TITLE:
DB-L1
Single Line Diagram

IBUYA Consulting Engineers
"POWERING DEVELOPMENT"
BLOCK D
ESSEX PARK
46 ESSEX TERRACE
WESTVILLE
P.O. BOX 1692
WANDSBECK 3631
TEL: +27 (031) 2667332
FAX: +27 (031) 2667340
E-mail: ibuya@ibuya.co.za

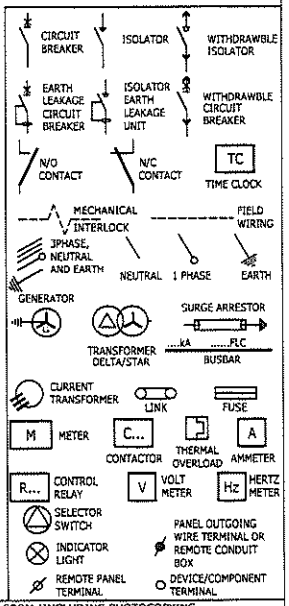


GENERAL NOTES:

A) DROPPERS/TAILS TO BE RATED FOR I^2t LET THROUGH
B) HARNESSED WIRING TO BE DERATED.
C) TUFFNOL BRACES NOT TO BE USED ABOVE 10kA.
D) COPPER BUSBARS TO BE CONTINUOUS RATED.
E) ENCLOSURE TO BE IP54.
F) PHASING R.W.B. TOP TO BOTTOM, LEFT TO RIGHT, BACK TO FRONT.
G) INTERNAL TEMPERATURE TO BE LIMITED TO 5° ABOVE ABOVE AMBIENT - MAX. 40°C.
H) CABLE ENTRIES AND GENERAL ARRANGEMENT TO SUIT INSTALLATION CONSTRAINTS.

ADDITIONAL NOTES:

1. ALL CIRCUIT BREAKERS, ISOLATORS AND EARTH LEAKAGE TO BE TYPE 2 CURVE AND EQUIPMENT TO BE CBI.
2. EARTH LEAKAGE TO BE 60A ISOLATOR WITH INTEGRAL 30mA.
3. RECESSED MOUNTED DB WITH ARCHITRAVE.
4. DB COLOUR TO BE WHITE.
5. DB TO BE TOP AND BOTTOM ENTRY
6. BUSBAR TO BE SHROUDED
7. EARTH & NEUTRAL BAR TO BE EASY ACCESSIBLE.
8. SUFFICIENT SPACE REQUIRED FOR SAFE ACCESS FOR REWIRNG.
9. ACCESS ZONE REQUIRED THROUGH SHROUD
10. ALL SINGLE PHASE OUTGOING CIRCUIT BREAKERS TO BE LABELLED WITH DESCRIPTION OF SERVICES AND CIRCUIT Nos. AS PER DRAWING.



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0	Original Issue	CG	18/3/24	

ENGINEER	DRAWN	DATE:	SCALE:	CHKD.
S.Nzama	CG	March 24	n.t.s	
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PROJECT No.	DRAWING No.	SHEET:	REV.
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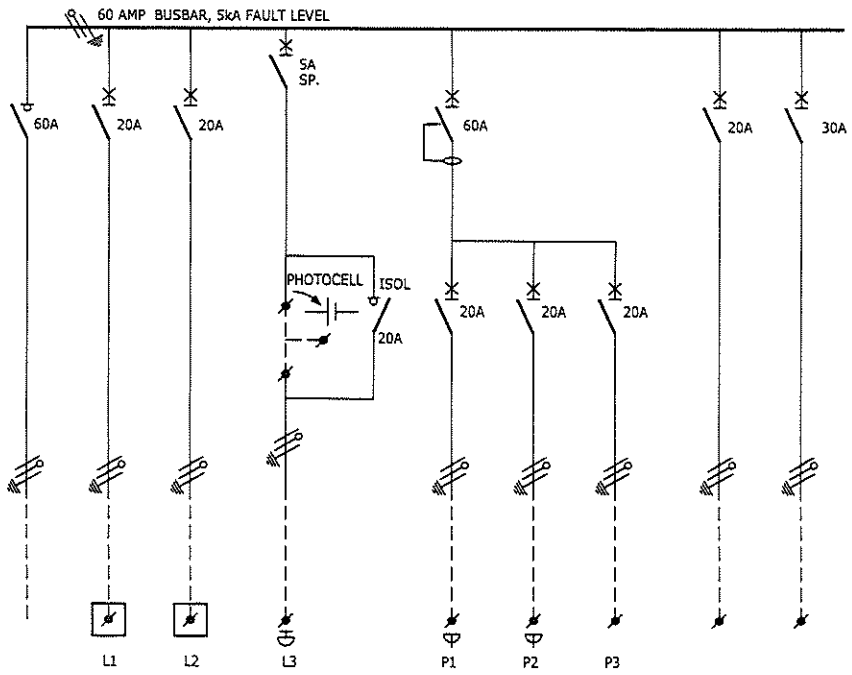
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TITLE
St Andrews Hospital Asbestos Erad & Roof Works Electrical Installation

DRAWING TITLE:
DB-L2

Single Line Diagram

IBUYA Consulting Engineers
"POWERING DEVELOPMENT"
BLOCK D
ESSEX PARK
46 ESSEX TERRACE
WESTVILLE
P.O. BOX 1692
WANDSBECK 3631
TEL: +27 (031) 2667332
FAX: +27 (031) 2667340
E-mail: ibuya@ibuya.co.za

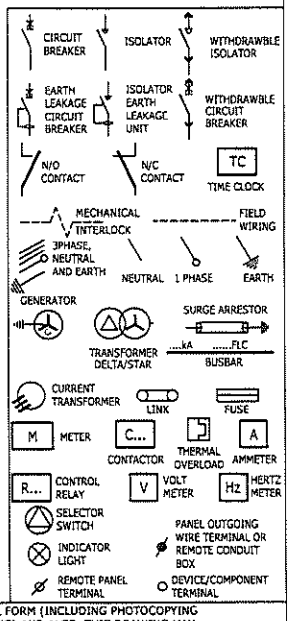


GENERAL NOTES:

A) DROPPERS/TAILS TO BE RATED FOR ± LET THROUGH
B) HARNESSED WIRING TO BE DERATED.
C) TUFFNOL BRACES NOT TO BE USED ABOVE 10kA.
D) COPPER BUSBARS TO BE CONTINUOUS RATED.
E) ENCLOSURE TO BE IPS4.
F) PHASING R.W.B. TOP TO BOTTOM, LEFT TO RIGHT, BACK TO FRONT.
G) INTERNAL TEMPERATURE TO BE LIMITED TO 5° ABOVE ABOVE AMBIENT - MAX. 40°C.
H) CABLE ENTRIES AND GENERAL ARRANGEMENT TO SUIT INSTALLATION CONSTRAINTS.

ADDITIONAL NOTES:

1. ALL CIRCUIT BREAKERS, ISOLATORS AND EARTH LEAKAGE TO BE TYPE 2 CURVE AND EQUIPMENT TO BE CBI.
2. EARTH LEAKAGE TO BE 60A ISOLATOR WITH INTEGRAL 30mA.
3. RECESSED MOUNTED DB WITH ARCHITRAVE.
4. DB COLOUR TO BE WHITE.
5. DB TO BE TOP AND BOTTOM ENTRY
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7. EARTH & NEUTRAL BAR TO BE EASY ACCESSIBLE.
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0	Original Issue	CG	18/3/24	

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S.Nzama	CG	March 24	n.t.s	
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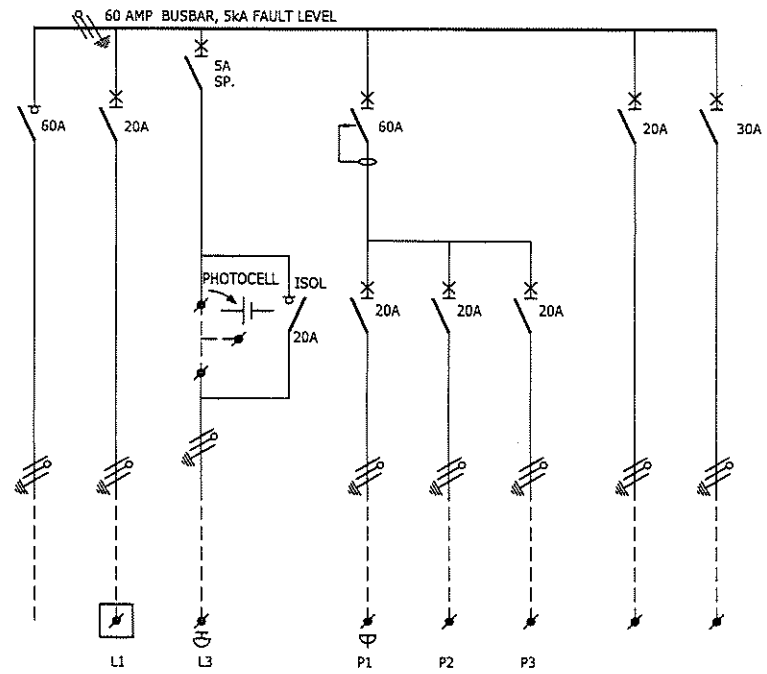
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File Name : Lyr:0:1:A3

TITLE
St Andrews Hospital Asbestos Erad & Roof Works Electrical Installation

DRAWING TITLE:
DB-M
Single Line Diagram

IBUYA Consulting Engineers
"POWERING DEVELOPMENT"
BLOCK D
ESSEX PARK
46 ESSEX TERRACE
WESTVILLE
P.O. BOX 1692
WANDSBECK 3631
TEL: +27 (031) 2667332
FAX: +27 (031) 2667340
E-mail: ibuya@ibuya.co.za

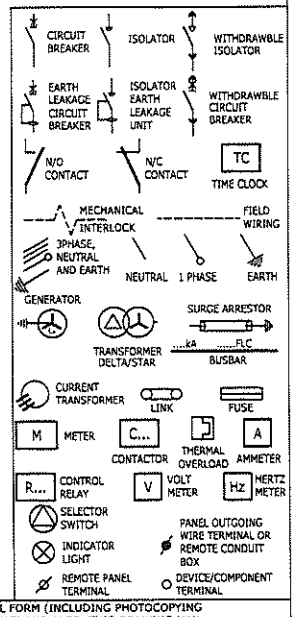


GENERAL NOTES:

A) DROPPERS/TAILS TO BE RATED FOR I^2t LET THROUGH
B) HARNESSED WIRING TO BE DERATED.
C) TUFFNOL BRACES NOT TO BE USED ABOVE 10kA.
D) COPPER BUSBARS TO BE CONTINUOUS RATED.
E) ENCLOSURE TO BE IP54.
F) PHASING R.W.B. TOP TO BOTTOM, LEFT TO RIGHT, BACK TO FRONT.
G) INTERNAL TEMPERATURE TO BE LIMITED TO 5° ABOVE ABOVE AMBIENT - MAX. 40°C.
H) CABLE ENTRIES AND GENERAL ARRANGEMENT TO SUIT INSTALLATION CONSTRAINTS.

ADDITIONAL NOTES:

1. ALL CIRCUIT BREAKERS, ISOLATORS AND EARTH LEAKAGE TO BE TYPE 2 CURVE AND EQUIPMENT TO BE CBI.
2. EARTH LEAKAGE TO BE 60A ISOLATOR WITH INTEGRAL 30mA.
3. RECESSED MOUNTED DB WITH ARCHITRAVE.
4. DB COLOUR TO BE WHITE.
5. DB TO BE TOP AND BOTTOM ENTRY
6. BUSBAR TO BE SHROUDED
7. EARTH & NEUTRAL BAR TO BE EASY ACCESSIBLE.
8. SUFFICIENT SPACE REQUIRED FOR SAFE ACCESS FOR REWIRNG.
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10. ALL SINGLE PHASE OUTGOING CIRCUIT BREAKERS TO BE LABELLED WITH DESCRIPTION OF SERVICES AND CIRCUIT Nos. AS PER DRAWING.



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0	Original Issue	CG	18/3/24	

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S.Nzama	CG	March 24	n.t.s	
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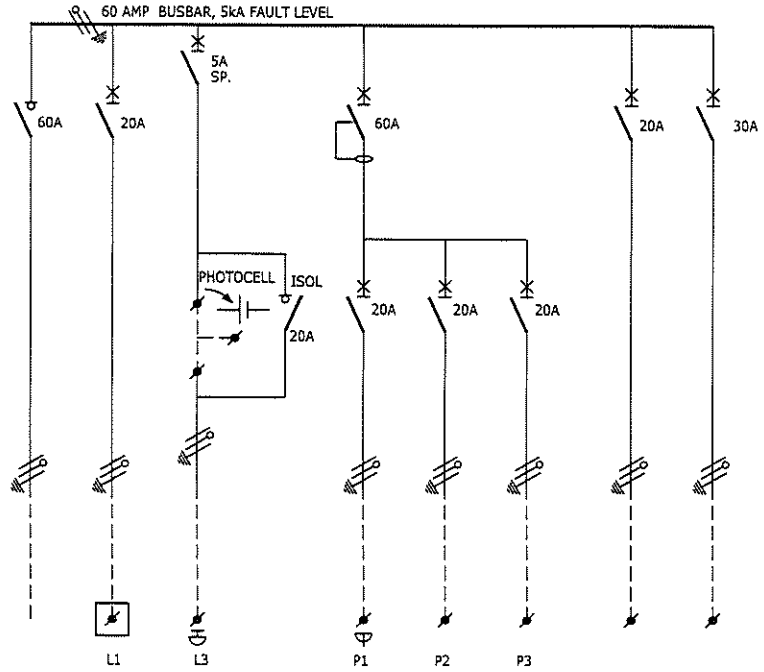
PROJECT No.	DRAWING No.	SHEET:	REV.
22015	407	1 of 1	O

File Name : Lyr:0:1:A3

TITLE
St Andrews Hospital Asbestos Erad & Roof Works Electrical Installation

DRAWING TITLE:
DB-OT
Single Line Diagram

IBUYA Consulting Engineers
"POWERING DEVELOPMENT"
8LOCK D
ESSEX PARK
46 ESSEX TERRACE
WESTVILLE
P.O. BOX 1692
WANDSBECK 3631
TEL: +27 (031) 2667332
FAX: +27 (031) 2667340
E-mail: ibuya@ibuya.co.za



PHASE
CIRCUIT No.

DESIGNATION

INCOMER	LIGHTING	OUTDOOR LIGHTS	SSOs	SPARE	SPARE	SPARE	SPARE

WIRING

10mm² 2CORE Cu PVC SWA PVC ECC CABLE	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	3x2,5mm² PVC INSULATED TWIN AND EARTH CABLE	3x2,5mm² PVC INSULATED WIRE

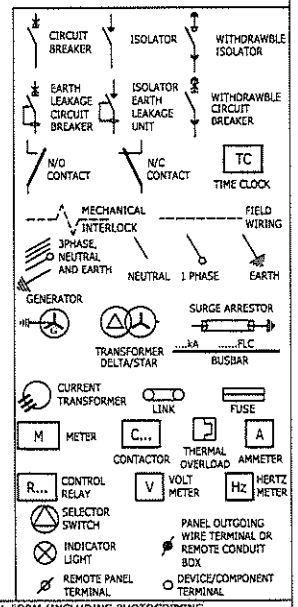
LOAD (AMPS)
No. OF POINTS

GENERAL NOTES:

A) DROPPERS/TAILS TO BE RATED FOR ι LET THROUGH
B) HARNESSED WIRING TO BE DERATED.
C) TUFFNOL BRACES NOT TO BE USED ABOVE 10kA.
D) COPPER BUSBARS TO BE CONTINUOUS RATED.
E) ENCLOSURE TO BE IP54.
F) PHASING R.W.B. TOP TO BOTTOM, LEFT TO RIGHT, BACK TO FRONT.
G) INTERNAL TEMPERATURE TO BE LIMITED TO 5° ABOVE ABOVE AMBIENT - MAX. 40°C.
H) CABLE ENTRIES AND GENERAL ARRANGEMENT TO SUIT INSTALLATION CONSTRAINTS.

ADDITIONAL NOTES:

1. ALL CIRCUIT BREAKERS, ISOLATORS AND EARTH LEAKAGE TO BE TYPE 2 CURVE AND EQUIPMENT TO BE CB1.
2. EARTH LEAKAGE TO BE 60A ISOLATOR WITH INTEGRAL 30mA.
3. RECESSED MOUNTED DB WITH ARCHITRAVE.
4. DB COLOUR TO BE WHITE.
5. DB TO BE TOP AND BOTTOM ENTRY
6. BUSBAR TO BE SHROUDED
7. EARTH & NEUTRAL BAR TO BE EASY ACCESSIBLE.
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REV	DESCRIPTION	BY	DATE	CHKD.
0	Original Issue	CG	18/3/24	

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S.Nzama	CG	March 24	n.t.s	
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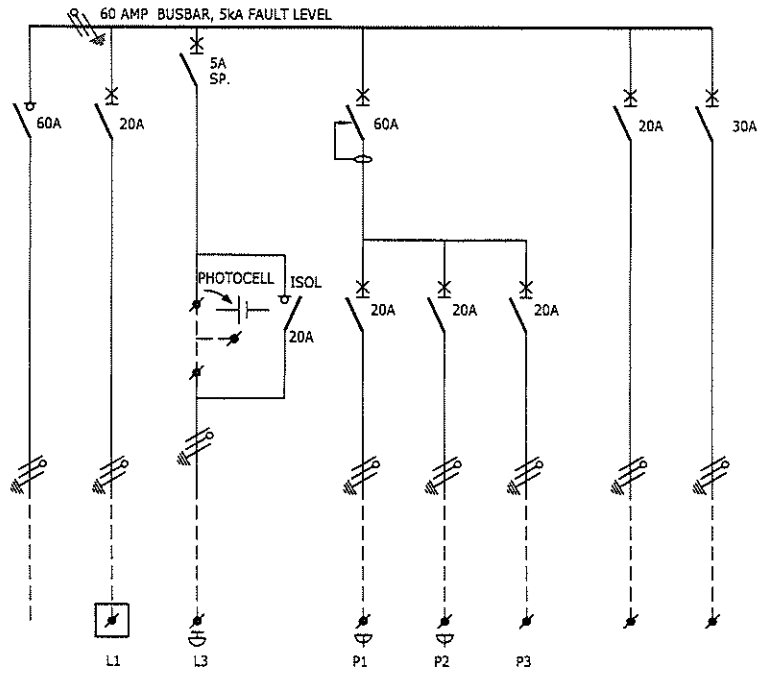
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File Name : Lyr:0:1:A3

TITLE
St Andrews Hospital Asbestos Erad & Roof Works Electrical Installation

DRAWING TITLE:
DB-T
Single Line Diagram

IBUYA Consulting Engineers
"POWERING DEVELOPMENT"
BLOCK D
ESSEX PARK
46 ESSEX TERRACE
WESTVILLE
P.O. BOX 1692
WANDSBECK 3631
TEL: +27 (031) 2667332
FAX: +27 (031) 2667340
E-mail: ibuya@ibuya.co.za

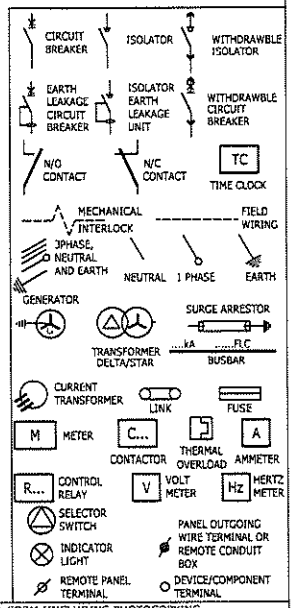


GENERAL NOTES:

A) DROPPERS/TAILS TO BE RATED FOR t LET THROUGH
B) HARNESSED WIRING TO BE DERATED.
C) TUFFNOL BRACES NOT TO BE USED ABOVE 10kA.
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F) PHASING R.W.B. TOP TO BOTTOM, LEFT TO RIGHT, BACK TO FRONT.
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ADDITIONAL NOTES:

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6. BUSBAR TO BE SHROUDED
7. EARTH & NEUTRAL BAR TO BE EASY ACCESSIBLE.
8. SUFFICIENT SPACE REQUIRED FOR SAFE ACCESS FOR REWIRING.
9. ACCESS ZONE REQUIRED THROUGH SHROUD
10. ALL SINGLE PHASE OUTGOING CIRCUIT BREAKERS TO BE LABELLED WITH DESCRIPTION OF SERVICES AND CIRCUIT Nos. AS PER DRAWING.



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REV	DESCRIPTION	BY	DATE	CHKD.
0	Original Issue	CG	18/3/24	

ENGINEER	DRAWN	DATE:	SCALE:	CHKD.
S.Nzama	CG	March 24	n.t.s	
			PAPER SIZE: A3	

PROJECT No.	DRAWING No.	SHEET:	REV.
22015	409	1 of 1	O

File Name : Lyr:0:1:A3

TITLE
St Andrews Hospital Asbestos Erad & Roof Works
Electrical Installation

DRAWING TITLE: Typical Distribution Board for DB:W1 - W5

Single Line Diagram

IBUYA Consulting Engineers
"POWERING DEVELOPMENT"
BLOCK D
ESSEX PARK
46 ESSEX TERRACE
WESTVILLE
P.O. BOX 1692
WANDSBECK 3631
TEL: +27 (031) 2667332
FAX: +27 (031) 2667340
E-mail: ibuya@ibuya.co.za

Type	Image	Description	Installation	Lamps		Qty	Location	Comments
				Type	Colour			
A		LED Linear vapour proof fitting (IP65), with poly carbonate UV protected diffuser and stainless clips. (160 - 180 lumens per watt and CRI 80+). Complete with 5 year warantee	Surface Mounted	35-40W LED	4000K		Internal & External	Supplied by BEKA/ Rubicon Lighting / ETAP / Performace Lighting / Lighting Innovations or equal and approved
B		Surface mounted IP65 high pressure die cast aluminium bulkhead fitting with high impact polycarbonate diffuser and black trim. (127 lumens per watt and CRI 80+). Complete with 5 year warantee.	Surface Mounted	18W LED	4000K		Internal & External	Supplied by BEKA/ Rubicon Lighting / ETAP / Performace Lighting / Lighting Innovations or equal and approved

Notes
Samples of all luminaires are to be presented for approval before orders are placed.
Quantities are to be confirmed by contractor
Lamps to be Osram ,Phillips or equal and approved. Control gear to be Osram, Phillips, Tridonic, V&S or equal and approved . Full details to be submitted with sample.

REV	DESCRIPTION	BY	DATE	CHKD
0	ORIGINAL ISSUE	MK	29/03/23	MK

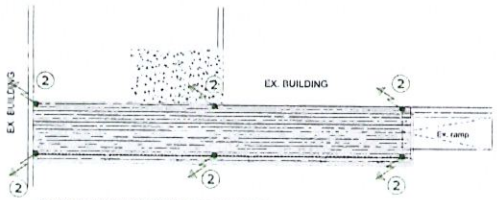
ENGINEER:	DRAWN:	DATE:	CHKD	P SIZE
KS	RM	March'23	KS	A4
PROJ No.:		DWG No	REV	SCALE
22015		600	0	nts

FILE NAME: SHEET: 1 of 1

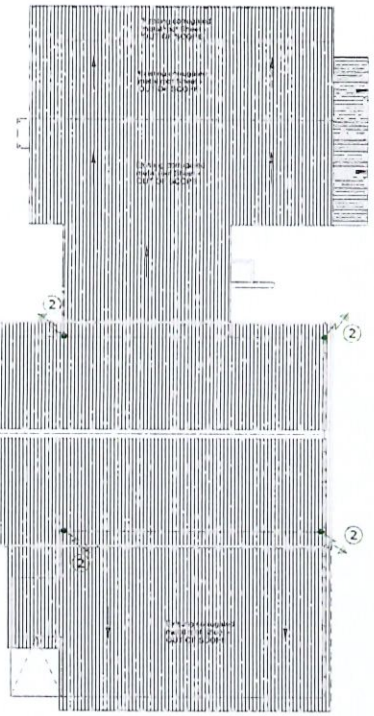
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St Andrews Hospital Asbestos Erad & Roof Works

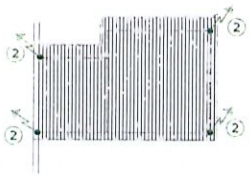
Luminaire Schedule

IBUYA Consulting Engineers
"POWERING DEVELOPMENT"

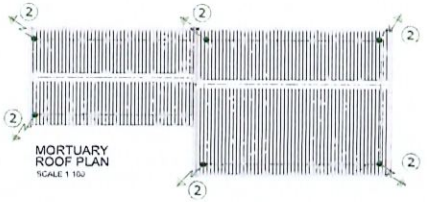


ROOF PLAN (WALKWAY LABORATORY)
SCALE 1:100

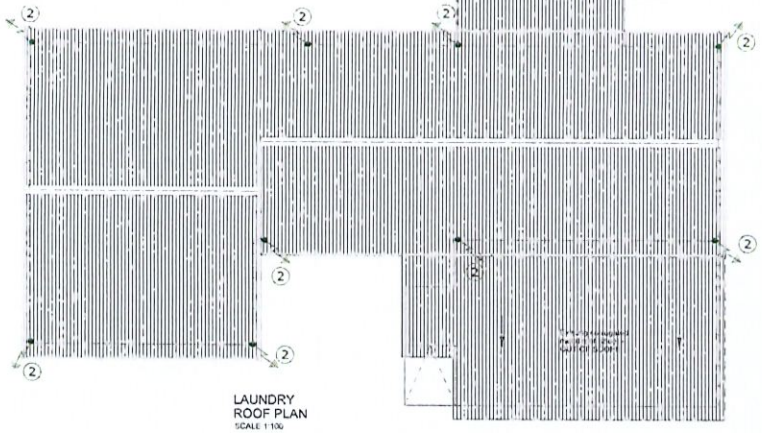




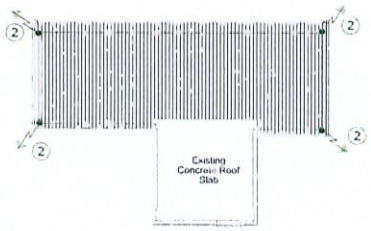
TUCKSHOP
ROOF PLAN
SCALE 1:100



MORTUARY
ROOF PLAN
SCALE 1:100



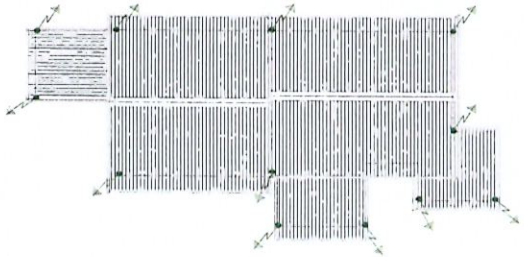
LAUNDRY
ROOF PLAN
SCALE 1:100



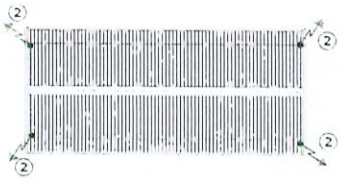
DOCTORS HOUSE
ROOF PLAN
SCALE 1:100



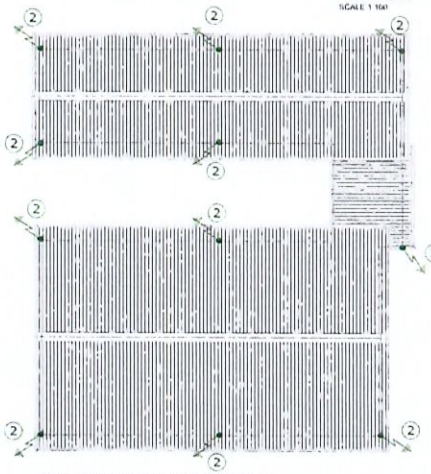
WORKSHOPS
ROOF PLAN
SCALE 1:100



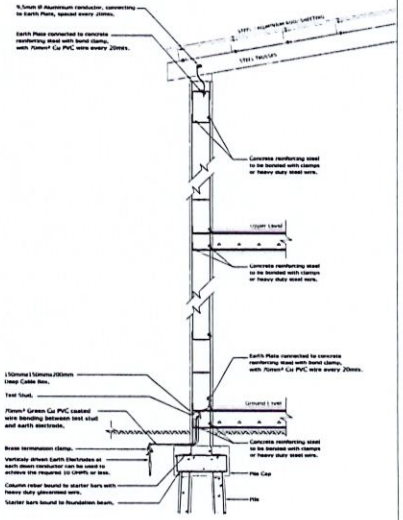
OCC. HEALTH - AUDOMETRY
ROOF PLAN
SCALE 1:100



OCCUPATIONAL THERAPY
ROOF PLAN
SCALE 1:100



CRISIS CENTRE & WOMENS HEALTH
ROOF PLAN
SCALE 1:100



GENERAL NOTES

This drawing is issued for Electrical purposes only, and should be read in conjunction with the Electrical Specification, setting out of Electrical and Electronic accessories are to be as indicated on Architects details.

Refer to Architects and Structural Drawings for all building dimensions, latest building revisions and services.

Do not scale this drawing.

All work to comply with relevant Standards, Specifications and Regulations.

Notwithstanding anything to the contrary, all the part of this drawing may be reproduced in any form (including photocopying or storage in any medium by electronic means and whether or not transiently or incidentally to some other use of this drawing), in addition, this drawing may not be used for any purpose or reason other than for which it was originally issued, without written permission of the author.

DRAWING NOTES:

LIGHTNING PROTECTION EARTH TERMINATION.

(1) Pile sturdwork used as lightning protection earth termination. Contractor to ensure that foundation and column sturdwork is electrically continuous.

LIGHTNING PROTECTION DOWN CONDUCTORS.

(2) Column sturdwork to be utilised as down conductors. Contractor to ensure sturdwork is bonded together with shunt bolting were.

(3) Contractor to ensure horizontal sturdwork is continuous between columns.

LIGHTNING PROTECTION AIR TERMINATION NETWORK.

(4) Steel roof covering and steel roof structure to be utilised as air terminations.

(5) A 5mm Ø Aluminium circular conductor fixed to parapet wall / building structure with preparatory fixings.

(6) A 5mm Ø Cu Tails between top of column sturdwork and air termination or steel roof and columns.

(7) A 5mm Ø Aluminium circular conductor connecting parapet conductor to parapet corbeils sturdwork.

(8) Suitable bonds between dissimilar metals to be utilised.

(9) A 5mm Ø Aluminium circular conductor connects to roof steel columns.

LIGHTNING PROTECTION TESTING.

(10) Impedance readings are to be carried out at the top of piles surveyor. The reading should be less than 10Ω.

(11) Should the required readings not be achieved, then a 70mm² copper conductor, installed in rock in 75mm pre excised, is to connect the air termination network and 1.8m copper earth rods driven into the ground at 3m spacings interconnected with 70mm² BLOW until 10Ω is achieved at each point.

BONDING

70mm² Cu Tails between column sturdwork and holdstrakes.

All steel pavement and roof membranes in to be bonded together with 70mm² PVC insulated Cu wire.

EARTHING NOTES:

(1) Telecommunications Earth Unit. 1.8m copper earthrods interconnected with 70mm² BLOW spaced at 3mtrs to achieve less than 1Ω. 2 x 70mm² PVC/Cu conductors to earth bar in Server Room.

(2) Electrical Earth Unit. 1.8m copper earthrods interconnected with 70mm² BLOW spaced at 3mtrs to achieve less than 1Ω. 2 x 70mm² PVC/Cu conductors to earth bar in Substation.

(3) 2 x 70mm² PVC/Cu below ground conductors to earth bar.

(4) Earth Resistivity testing is to undertaken at locations indicated.

P	25/02/22	AB	Original Issue
Rev	Date	Drn	Description

REVISIONS

IBUTA Consulting Engineers

St Andrews Hospital Asbestos Erad & Roof Works

Electrical Installation

Lightning Protection Layouts

DRAWN	CHECKED BY	DATE	CHECKED	SCALE
SW	AB	Feb '22	SW	1:100

PROJECT No.	DRAWING No.	REV.
22015	900	0

NOTES: (1) = Contractor to ensure max distance between drive bonds 20 metres notwithstanding anything to contrary.

(2) = Drive bonds required after every second 90 deg. bend or 15Ω dog, bend or other bends.

(3) = All unwanted conduits to be provided with draw wires. These will be withdrawn and checked at random.

(4) = Cast in conduits to be spaced 15mm. maximum.

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 1

DOH - STANDARD PREAMBLES TO ALL TRADES: REVISION 3 JANUARY 2009



KWAZULU-NATAL

DEPARTMENT OF HEALTH

STANDARD PREAMBLES TO ALL TRADES

REV 3 – JANUARY 2009

Compiled by:
Department of Health
Infrastructure Development
Engineering Services
Private Bag X9051
PIETERMARITZBURG
3201

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NOTE:

Only those clauses or portions of clauses in the following preambles, which refer to items in the Bills of Quantities, shall be considered as applying to the performance of this Contract.

2.

1. **ALTERATIONS**

SITE VISIT: — Tenderers are advised to visit the site prior to tendering and satisfy themselves as to the nature and extent of the work to be done, also to examine the condition of all existing buildings as no claim will be entertained on the grounds of ignorance of the conditions under which the work was to be executed.

MATERIALS FROM THE ALTERATIONS: — unless otherwise stated, will become the property of the Contractor and all these materials, together with all rubbish and debris must be carried away and the site left clean and unencumbered.

Items described as "removed" shall mean removed from the site.

Credit for the value of materials from the alterations is to be allowed for on the Summary/ Final Summary page.

Items described as to be re-used or to be handed over to the Administration are to be dismantled where necessary and stacked on site where directed, and the Contractor will be responsible for their removal and storage until required, and shall make good all items missing, damaged or broken at his own expense.

Unless otherwise described, no materials from the alterations shall be re-used in any new work without the written approval of the Department.

Prior to the removal of any timbers from the site, these are to be inspected by Government Entomologists. If any of these timbers are infested by wood destroying agencies, these timbers are to be disposed of in the manner prescribed by the Government Entomologist.

In taking down and removing existing work, particular care must be taken to avoid any structural or other damage to the remaining portions of the buildings.

ASBESTOS REGULATIONS 2001:

In terms of Asbestos Regulations 2001, no individual person, contractor or agent shall remove, demolish or strip any building containing asbestos or products containing asbestos (including asbestos roof sheeting, ceilings, guttering and down pipes) unless the work is performed by a **"Registered Contractor", registered with the Department of Labour**. All asbestos work shall be carried out under the supervision of an "Approved Inspection Authority".

It is a requirement that before any work involving asbestos removal is carried out, the following procedure and documentation is followed: -

1. Prior to the commencement of any demolition work, written notification shall be given to the Assistant Manager (Inspection and Enforcement), Durban Labour Centre, Masonic Grove, Durban, stating the name, address and details of the person(s) removing or stripping the asbestos. The notification shall include the date, time and place where the proposed work is to be carried out. (Regulation 3).

2. The name and details of the Approved Inspection Authority that is to supervise and confirm that the work is being carried out according to the specific requirements of the Asbestos Regulations 2001 (as amended), including the approved "written work procedure" document. This document shall be submitted and signed at least 14 days prior to commencement of demolition work by the Approved Inspection Authority. (Regulation 21).

3. The production of valid accreditation certification of training for all employees involved in the asbestos removal work.

4. On completion of the asbestos related work a "Clearance Certificate" which includes the asbestos disposal certificate shall be forwarded to the Department by the Approved Inspection Authority.

In terms of the above regulations, it is an offence to carry out any asbestos work as defined in the above regulations without the necessary approval / requirements being met.

Individual persons or contractors found to contravene these regulations will be issued with a **PROHIBITION NOTICE** which in effect will stop all work on site and the offenders will then be liable for prosecution.

Any employer found guilty under the Asbestos Regulations 2001 may be liable to a fine and or imprisonment not exceeding 12 months.

NOTICE OF DISCONNECTIONS: — The Contractor is to give ample notice to the Department and Local Authorities regarding any disconnections necessary prior to the removal or interruption of electrical or telephone cables, water supply and sanitary services, etc.

DUST: — The Contractor is to allow in his rates for taking all precautions necessary to prevent any nuisance from dust whilst carrying out the works.

SHORING: — Rates for shoring are to include for the use and waste of all props, needles, wedges, braces, nails and screws, etc. required and for all cutting, notching, framing and fitting, maintaining in position for the required periods and removing at completion. All shoring is to be executed in a manner approved by the Department.

MATCHING EXISTING WORK: — The terms "make good" or "making good" to existing work as described in the items shall mean making good with materials to match, all joined to existing.

FORMING NEW OPENINGS, ETC. IN EXISTING WALLS: — Rates for items of forming new or altering existing openings are, unless otherwise stated, to include for the following: -

a) Breaking out for and inserting adequate lintels over the new openings (except where stated in the items as being below an existing beam, slab or lintel), to the approval of the Department. The lintels are to be of in-situ concrete Class C, or of pre-cast pre-stressed concrete or of brickwork in 1:3 cement mortar, with a minimum bearing of 230mm at each end and suitably reinforced, and rates are to include for all necessary formwork, turning pieces, etc. and for wedging and pinning up to existing brickwork over in 1:3 cement mortar.
b) All shoring and propping required.
c) Facing up jambs in new brickwork in cement mortar properly bonded to existing,
d) Building up the portions of the openings stated in the items in new brickwork in cement mortar properly bonded to existing.
e) Formwork for concrete sills and thresholds where required.
f) Making good only to the finishes as stated in the items. (Note: — The making good of paint finishes has been measured separately).
g) Forming rounded angles, throats on external plastered soffits, mitres, etc. where required in all new plaster, render and granolithic finishes.

The supply, building in, fixing, etc. of all windows, doors, frames, etc. to the newly formed openings and the removal of all existing windows, doors, frames, etc. from openings to be altered, have been elsewhere measured.

2. EARTHWORKS

SITE CLEARANCE: —The item given in the Bills of Quantities for site clearance shall be deemed to include the removal from the site, or burning if permitted by the Local Authority, of shrubs and trees with trunks under 200mm girth measured at 1m above ground level,

hedges, bushes, other vegetation, rubbish and debris.
Holes left by roots are to be backfilled with earth and rammed.

EXCAVATIONS: — Rates for excavations are to include for forming and trimming to the correct levels, falls, slopes, curves, etc. for trimming sides, stepping, levelling and ramming bottoms, staging and disposing of the excavated material as described in the items. Rates for excavations to reduce levels over site are also to include for forming and trimming banks to the required batter. The Contractor is to allow in his rates for the bulking of excavated material.

The term "excavate", unless otherwise stated, shall mean excavate in "soft excavation" as defined below and for the purpose of classifying excavations the following will apply: —

a) **Soft excavation**: — shall be excavation in material that can be efficiently removed by a back-acting excavator of flywheel power approximately 0, 10 kW per millimetre of tined-bucket width without the assistance of pneumatic tools such as paving breakers, or that can be efficiently loaded without prior ripping or stockpiling by a rubber tired front-end loader of approximately 15t mass and a flywheel power of approximately 100 kW.

b) **Intermediate excavation**: — shall be excavation in material that requires a back-acting excavator of flywheel power exceeding 0,10kW per millimetre of tined-bucket width and the assistance of pneumatic tools prior to removal by equipment equivalent to that specified in (a) above.

c) **Hard rock excavation**: — shall be excavation in material that cannot be efficiently removed without blasting or without wedging and splitting prior to removal.

d) **Class A Boulder excavation**: — shall be excavation in material containing more than 40% by volume of boulders of size between 0.03m³ and 20m³ in a matrix of softer material or smaller boulders.
Note: — Excavation of solid boulders or lumps of size exceeding 20m³ will be classed as hard rock excavation. (2) Excavation of fissured or fractured rock will not be classed as boulder excavation but as hard rock or intermediate excavation according to the nature of the material.

e) **Class B Boulder excavation:** — shall be excavation of boulders only in a material containing 40% or less by volume of boulders of size between 0.03m³ and 20m³ in a matrix of softer material or smaller boulders.
Note: — Those boulders requiring individual drilling and blasting in order to be loaded by a back-acting excavator as specified in (a) above, or by a track type front-end loader, will each be separately measured as Class B boulder excavation.
The excavation of the rest of the material will be classed as soft or intermediate excavation according to the nature of the material.

Method of Classifying: —The Contractor may use any method he chooses to excavate any class of material but his chosen method of excavation shall not determine the classification of the excavation. The Department will decide on the classification of the materials. The classification will be based on inspection of the material to be excavated and the criteria given in (a) to (e) above, as applicable. The decision of the Department shall be, subject to the relevant provisions of the contract, final and binding.

Should the Contractor consider that the excavation is other than "soft excavation" he must notify the Department immediately in order that an inspection be made and a decision arrived at by the Department as to the category of such excavation. Should the Contractor fail to give such notification, the excavation shall be deemed to be "soft excavation" and shall be measured and valued accordingly.

Blasting will only be permitted with the written authority of the Department, if and when permission is granted, it is to be executed only by persons holding the necessary Government Blasting Certificate and subject to all regulations imposed by the Department and/or Local Authority. In addition, the Contractor is to indemnify the Provincial Administration against all claims in respect of damage to persons and property resulting from such blasting operations.

Before commencing any excavations, the Contractor must satisfy himself as to the accuracy of any levels indicated on the drawings, as no claim will be entertained at a later date for any alleged inaccuracy in such levels.

Excavation shall be carried down to such depths as are necessary to obtain firm foundations, but before proceeding to greater depths than are shown on the drawings, the Department's approval must be obtained.

The Contractor will be responsible if he excavates wider or deeper than shown or required. If the excavations are deeper than shown or required such extra excavations are to be filled in with mass concrete at the Contractor's expense. If the excavations are wider than shown or required, any form-wait or mass concrete filling required to the side of the concrete foundations is to be executed at the Contractor's expense and to the approval of the Department.

Depths of excavations as approved shall be checked and recorded by the a Departmental Official and the Contractor's Foreman before any concrete is laid or the excavations are otherwise covered or filled in.

Notwithstanding such approval, any excavations which become waterlogged or otherwise spoilt after approval, shall be cleaned out and reformed, at the Contractor's expense and to the satisfaction of the Department, before any concrete, etc. is laid.

WATER: — The Contractor shall keep all excavations free from water or mud by pumping, baling or otherwise.

WORKING SPACE: — The Contractor is to allow against the items of "excavate to provide working space" for excavating beyond the extent of the net excavations measured to provide the necessary working space for the carrying out of such work as is described in the items. Rates are to include, in addition to the extra excavation, for any additional risk of collapse so incurred and for filling back and compacting the excavated material.

No separate item for working space is provided or will be considered where the face of the measured excavation is 750mm or more away from the finished face of the structure. Separate items for working space for the building of brick foundation walls on ordinary concrete wall footings will not be considered.

In the case of column base and pile cap excavations, where the dimensions between the column face and the excavation face is less than 500mm, working space has been measured for the width of the column face from the commencing level of excavation to the top of the column base or pile cap only where the top of the column base or pile cap exceeds 1.5m below the commencing level of excavation.

RISK OF COLLAPSE: — The Contractor shall maintain all excavated faces affecting the safety of the works and workmen. He must either provide all necessary temporary planking, strutting or shoring to all vertical excavated faces or carry the risk of collapse of these faces with all its implications. He must assume full responsibility in this connection and must allow in his rates accordingly. In addition, all excavated faces exceeding 1.5m deep are to be maintained in accordance with Government Regulations.

Quantities reflect the total superficial areas of the vertical excavated faces and will be subject to variation only in so far as these areas may vary, notwithstanding whether any temporary supports are used or not.

FILLING, ETC.: — All backfilling and filling under floors and paving must be of selected material from the excavations, unless otherwise stated, returned and compacted in layers as later described and with the top surface dressed to the correct levels and grades, all to the approval of the Department. Under no circumstances will the Contractor be allowed to use clay, peat or other unsuitable material for filling.

Rates for all items of filling with material from the excavations are to include haulage not exceeding 100m from the perimeter of the excavations.

Any filling supplied by the Contractor is to be of suitable material approved by the Department.

COMPACTION OF FILLING ETC.: — All filling and backfilling is to be done in layers not exceeding 200mm thick before compaction, with the layers level to ensure uniform compaction. Each layer is to be thoroughly compacted over the whole of the area to a dry density not less than 90% of Mod. A.A.S.H.O. density. The surface of each compacted layer shall be uniform and tightly bonded. Care is to be taken that no damage is done to foundation walls, drains and other services.

The densities of compaction referred to are to be determined by tests carried out in accordance with A.S.T.M. Designation D 1557-58 and at an optimum moisture content of not more or less than 5% of the required Mod. A.A.S.H.O. The Contractor shall be responsible for having sufficient tests taken of the density of the compacted filling to ensure that the required compaction is being attained to the satisfaction of the Department. These tests are to be undertaken by an independent testing authority nominated by the Contractor to the approval of the Department. The costs of all tests in this connection shall be borne by the Contractor and shall be allowed for in his rates.

PROTECTION AGAINST SUBTERRANEAN WOOD-DESTROYING TERMITES: — Where protection against termites is to be provided: —

a) Remove vegetable matter
All dead roots and other vegetable matter likely to encourage termites must be removed from the ground under, against the building and from all filling material.

b) Treating the ground
The ground under surface beds, and below suspended wood floors, must be treated by the application of Soil Insecticides of Chlordane or Aldrin types complying with SANS Specifications 1165 and 1164 respectively, mixed with water and applied at the rate of not less than 5 litres of solution per square metre uniformly over the whole surface. The concentration of the solution must be strictly in accordance with the manufacturer's instructions and to the approval of the Department.

The Department reserves the right to take samples of the diluted solution, at any time, in order to test the concentration of the chemicals used.

Where the ground to be treated is of earth filling, the upper 50mm layer of filling must be levelled by raking, but must not be rammed until after the solution has been applied, and where of natural ground, it must be loosened to a depth of not less than 50mm and similarly levelled, in order to enable the solution to penetrate into the soil. After the solution has been applied and allowed to penetrate the surface, the soil must be well rammed and consolidated.

Before applying the solution to the ground under the floors, splay back earth for a depth and width of 75mm from the internal faces of walls enclosing the floors, against internal walls, sleeper piers, etc. and thoroughly saturate with the solution. After the solution has soaked into the earth, the splayed grooves must be filled with earth and consolidated.

The treated layer of soil under suspended wood floors must be protected with a 75mm thick layer of approved clean gravel, finished to an even surface.

The treated layer of soil under concrete surface beds must be protected with a 25mm thick layer of well-consolidated approved grit prior to laying the waterproofing membrane.

Great care must be taken when laying concrete surface beds, protective layers, etc. in order to avoid rupturing the treated layer of soil. Should the treated layer be ruptured at any

point it must be made good and the area affected re-treated with the soil insecticide.

Contractors are advised that:

a. Special precautions must be taken to protect the workmen whilst using the soil insecticide.
b. The treatment of filling or ground under floors shall be done as soon as practicable, so that treatment may dry out before the floors are laid.
c. The treatment of the ground must be carried out under the supervision of the Department.
d. The soil insecticide to be delivered to the site in sealed drums clearly labelled or stamped with the name of the product.
e. In addition to the foregoing the application of the soil insecticide to be carried out in accordance with SANS Code of Practice 0124 — the application of Certain Soil Insecticides for the Protection of Buildings.
f. The protective layers of gravel or grit have been measured separately.

RE-USE OF EXCAVATED MATERIAL: — Material of any kind that may be discovered on the site during the excavation shall remain the property of the Administration. Such material may, if approved, be used for aggregate. Material so used shall be valued and the value deducted from the Contract Sum.

DEMOLITIONS: — The Contractor is referred to the preambles for "Alterations" insofar as they apply and the following: —

The demolition of existing buildings is to be done in a practical and safe manner, under the continuous supervision of a competent Foreman. Rates for the demolition of existing buildings are to include for breaking up and removing all external screen walls, steps and ramps, surface water channels, rainwater sumps, gulleys, etc. and grubbing up and removing all foundation walls and footings, disconnecting and removing all services to a point not less than 1m beyond the perimeter of the buildings, plugging off ends of all remaining pipes, and for filling in all holes with clean earth and ramming up to ground level. All movable fittings and furniture, fire extinguishers and electrical and other equipment in the buildings to be demolished are to remain the property of and will be removed by the Administration prior to the commencement of the demolition.

Before commencing the demolitions, the Contractor shall comply with any Local Authority regulations in force in respect of rodent extermination, etc. and he shall obtain the required Clearance Certificate. Items to cover the cost of obtaining the certificate and the fumigation, etc. of the buildings to be demolished have been provided elsewhere in the Bills of Quantities, and the fumigation is to be carried out by a firm specialising in this type of work. The fumigation of the buildings to be demolished shall only be carried out if called for by the Local Authorities and if not required the value of the relevant items in the Bills of Quantities will be deducted from the Contract Sum.

After handing over the site to the Contractor, the risk of any loss or damage to the buildings to be demolished and the materials therein, caused by theft, vandalism, etc. shall be the responsibility of the Contractor and he shall take such precautions as he deems necessary against such loss or damage.

GRASS PLANTING AND TURFING: — Is to be "Cape Kweek" or "Umgeni" grass scientifically known as *Cynodon dactylon* or other local fine grass approved by the Department. In areas where fine grass does not grow readily, Kikuyu grass *Pennisetum clandestinum* may be substituted. The areas must be identified and the approval of the Department obtained before Kikuyu grass is to be planted.

Grass Planting To Level Areas: — The areas to receive grass are to be weeded and raked free of stones and other superfluous matter and all depressions left by the earthworks plant are to be filled in with approved topsoil. The planting of grass is to be carried out in continuous root planting in rows 200mm apart. The method of planting called "sprigging" may be used as an alternative.

Immediately after completion of each strip or square, the area thus grassed is to be thoroughly watered and lightly rolled. Any drifting or piling up of the top soil due to wind or any other cause must be prevented as far as possible and should such piling up of soil against newly planted grass occur the soil must immediately be raked level and lightly rolled.

Turfing: — Banks are to be carefully trimmed to an even surface and weeded and raked free of stones, etc. and all depressions filled in with approved topsoil as before described. Turfing of banks is to be carried out with 25mm thick maximum 500mm x 1000mm weed-free grass sods, of grass as before described, and as approved by the Department. The grass sods are to be set in position in horizontal rows to broken bond and closely fitted together and tamped flat with a timber pummel, a maximum of two sods in every square metre of area covered being staked to the bank to maintain position, with and including one sharpened wood or bamboo skewer 250mm long and with all cavities between sods filled in with approved top soil and the whole area lightly top soil dressed on completion.

Established Lawn: — The use of established lawn in pieces size approximately 500mm x 1000mm x 25mm thick in lieu of grass sods on banks will be permitted provided that the established lawn is supplied and laid by a firm experienced in this type of work and to the approval of the Department. The fitting, tamping, staking and top dressing must all be as described for turfing, except that one piece per square metre is required to be staked as described.

Fertilizer: — An approved fertilizer of the following types— Type 2:3:2 for grass planted levelled areas and Type 3:2:1 for turfed or established lawn covered banks is to be supplied and applied by the Contractor at the rate of 400 kg per hectare. In the case of grass planted levelled areas the fertilizer is to be applied either before or after grass planting and in the case of turfed or established lawn covered banks the fertilizer is to be applied after the sods or pieces have been laid.

The fertilizer above described is to in addition to any fertilizer which may have been specified to be applied during either the operation of scarifying and grading the area to be grassed or the re-spreading of top soil.

A sample of the existing topsoil or the topsoil to be re-spread is to be sent to an approved fertilizer manufacturer for testing and advice on the acid or alkaline content of the soil. The cost of this test is to be borne by the Contractor if this is not provided free by the fertilizer manufacturer.

The requisite quantities of limestone ammonium nitrate for acidic soil or ammonium sulphate for alkaline soil as determined by the soil test will be supplied to the Contractor by the Department and the cost thereof is to be included in a Provisional Sum elsewhere in the Bills of Quantities. The application of this treatment is to be undertaken by the Contractor and his rates for grassing, etc. must include for same.

Weed killer: — "Weed Master or Turf Master" or other approved weed killer is to be applied to the entire grassed or turfed areas at a rate of 4 litres mixed with 200 litres of water per hectare, this being equivalent to 40-45 millilitres mixed with 5 litres of water per fifty square metres. The solution is to be sprayed on with a suitable spraying apparatus to achieve an even distribution. Six to eight weeks later, the operation is to be repeated. The application of weed killer is not to take place during wet weather. Weather conditions should be such as to allow a minimum of two hours or absorption before the likelihood of rain.

Watering and Rolling: — The entire turfed area is to be kept clear of weeds, lightly rolled and thoroughly watered throughout the period of the Contract and or at least three months from the time of acceptance of the grounds or until the grassing or turfing is well established if that is sooner, all to the satisfaction of the Department.

In the absence of rain, the initial watering of grassed or turfed areas is to be carried out as follows: —

Grass planted levelled areas: - at least twice a week.
Established lawn areas: - at least once a week.
Turfed areas: - at least once a day for the first ten to fourteen days, thereafter at least once a week.

The Contractor must allow in his rates for providing and removing at completion all necessary temporary water piping complete with fittings, sprinklers, hoses, etc. as required for the proper watering of the grassed or turfed areas of the plateaux and banks.

Cutting of Grass: — The Contractor must commence mowing as soon as possible once turfed areas have become established and undertake regular mowing at approximately one-week intervals up to the date of final delivery, except that, during the maintenance period, the mowing of the plateaux will be undertaken by the Institution.

Note: — All stages of grass planting and turfing are to be supervised on a full time basis by a competent person with the necessary experience and knowledge.

It shall be the responsibility of the Contractor to advise the Department when the following operations are to be carried out in order that his representative may be present: —

a) the application of fertilizer
b) the application of weed killer.

Should the Contractor fail to do so, the Department shall have the right to instruct the Contractor to repeat the operation at his own expense.

3. CONCRETE, FORMWORK AND REINFORCEMENT

GENERAL: — This specification applies to concrete work formed into its final shape and position in-situ.

All concrete and formwork shall be carried out in accordance with SANS Specification 1200 G — Concrete (Structural) (a copy of which the Contractor will be required to keep on the site so that it can be referred to at all times during the Contract), with the following amplifications and amendments: —

INTERPRETATIONS: — Clauses 2.1 and 2.2 of SANS Specification 1200G refer. This preamble, together with any other supplementary preambles appearing in these Bills of Quantities shall be deemed to be the project specification and are the "Portion 2" referred to in Clause 2.2.

DEFINITIONS: — Clause 2.3 of SANS Specification 1200 G refers. All references to the Engineer shall be deemed to mean the Department.

MATERIALS
Cement: —unless otherwise specified, shall be one or more of the following and shall, in each case, comply with the requirements of the relevant standard specification: —
Portland cement and rapid-hardening cement to SANS 471 Specification
Portland blast-furnace cement to SANS Specification 626.
Portland cement 15 to SANS Specification 831.
Nevertheless, no cement other than ordinary Portland cement shall be used without the approval of the Department. Cement containing more than 15% blast-furnace slag will not be permitted in columns or in members less than 50mm thick.

In addition (for the abovementioned items) where Ordinary Portland cement is used, blast-furnace slag (from separate containers) **must not** be added in any proportion whatsoever.

No mixing of two different types of cement in the same batch will be allowed, and unless otherwise approved by the Department, the same brand and type shall be used in all exposed concrete.

Lumpy cement, broken sacks and sweepings shall not be used.

Cement supplied in sacks shall be used in the order in which it was delivered and shall not be kept in storage for longer than six (6) weeks without the approval of the Department.

Water: — Shall be clean and free from injurious amounts of acids, alkalis, sugar, organic matter and other substances that could impair the strength or durability of the concrete. If so required by the Department, the suitability of the water shall be proved by tests carried out by an approved laboratory.

Aggregates: — Unless otherwise specified both the coarse aggregate (stone) and the fine aggregate (sand) shall comply with the requirements of SANS Specification 1083. The Contractor is to prove compliance by means of either a certificate from the supplier or by grading analysis tests.

Admixtures: — i.e. materials other than cement, aggregate and water shall not be used in the concrete mix without the approval of the Department. The onus for proof of satisfaction to the Department for any admixture proposed shall be with Contractor.

Reinforcement: — for concrete shall be as specified and shall, in each case, comply with one of the following: —

a) Type A hot rolled mild steel bars of plain round cross section to SANS Specification 920
b) Type C Class 2 hot rolled high yield stress Grade 1 deformed bars to SANS Specification 920
c) Type D Grade 1 cold worked deformed bars to SANS Specification 920.
d) Welded steel fabric to SANS Specification 1024 manufactured from plain hard-drawn mild steel wire.

A sample reinforcing rod, approximately 600mm long, may be taken from each consignment of rods of similar diameter, for testing. If any sample is found unsatisfactory the whole consignment of rods from which the sample was taken will be rejected.

No substitution of the bars specified shall be made without the prior approval of the Department.

REINFORCEMENT

Bending: — Reinforcing bars shall be cut and bent according to the dimensions shown on the working drawings and in accordance with SANS Specification 82.

Except as allowed for below, all bars shall be bent cold and bending shall be done slowly, a steady even pressure being used without jerk or impact.

If approved by the Department, hot bending of bars of diameter at least 32mm shall be permitted, provided that the bars do not depend for their strength on cold working. When hot bending is approved, the bars shall be heated slowly to a cherry red heat (not above 840 C°) and after bending shall be allowed to cool slowly in air. Quenching with water shall not be permitted.

Fixing: — All steel reinforcement, at the time of placing of the concrete, must be free from loose rust, scale, oil and other agents which will reduce the bond between the steel and the concrete or initiate corrosion of the reinforcement. Reinforcement exposed to sea spray shall be washed down, and the formwork drained, just prior to concreting.

Reinforcement shall be positioned as shown on the working drawings or as directed by the Department and maintained in those positions within the tolerances given in the Specification for Tolerances. It shall be secured against displacement by tying at intersections with 1.6 or 1.25mm diameter annealed wire or by the use of suitable clips or, if permitted by the Department, by welding in accordance with SANS 1856. Welding will not

be permitted on cold worked bars. Reinforcement shall be supported in its correct position by hangers, saddles or cover blocks and aligned by chairs and spacers all of approved design and material. Where such hangers, saddles, chairs or spacers are of steel, they will be detailed on the drawings or in bending schedules.

Cover: —The minimum cover of concrete over reinforcement, excluding any applied finish, shall be as shown on the working drawings, or as directed by the Department.

Cover shall be maintained by using cover blocks, which shall be made of small aggregate concrete, not mortar, using the same cement and aggregate type and ratio as the parent concrete. Alternatively, cover blocks may be of the plastic type provided that sufficient number are used to prevent their collapse, that they are of a colour compatible with that of concrete and that the prior approval of the Department is given. Metal cover blocks shall not be used.

If the concrete face has a Class F2 smooth finish or some other special finish as is described elsewhere, hemispherical or pyramid shaped concrete cover blocks shall be used unless otherwise specifically approved by the Department.

Splicing: — or joining of reinforcing bars shall be made only as and where shown on the working drawings or as otherwise approved. The length of the overlap in a splice shall be not less than that shown on the working drawings or forty-five times the diameter of the bar if not shown.

Protection of Exposed Bars: — If left exposed for future bonding of extensions to the works, reinforcement shall be protected from corrosion as specified by the Department.

Electric Current: — Reinforcement shall not be used as a means for conducting electric current unless there is conformity with the requirements of SANS Code of Practice 03.

Inspection of Reinforcement: — Reinforcement shall be subject to inspection by the Department after the Contractor is satisfied that it has been completely and correctly fixed. The amount of notice given by the Contractor to the Department before concreting commences that reinforcement is ready for his inspection shall be agreed between the Department and the Contractor at the commencement of the Contract.

FORM WORK

Design: — Formwork shall be so designed and constructed by the Contractor that the concrete can be properly placed and compacted and that the required shapes, finishes, positions, levels and dimensions shown on the working drawings are maintained, subject to the tolerances given in the Specification for Tolerances. Unless otherwise directed by the Department, all formwork to beams and slabs shall be evenly cambered, unless otherwise specified or shown on the drawings, to the mid-point of the span of the member at the rate of 2mm per metre of span, all to the approval of the Department and the full cross section of the member shall be maintained after placing of concrete.

The formwork and joints shall be capable of resisting the dead load and pressure of the wet concrete, effect of vibration equipment, wind forces and all other superimposed loads and forces it is necessary for it to carry.

Should it be necessary to support formwork off suspended or ground bearing slabs, the manner of execution of the support shall be agreed with the Department so that overstress of, or damage to, those members is prevented.

In structures having, in whole or part, two or more reinforced concrete floors, props to the approval of the Department shall be provided under the soffits of beams and slabs of any floor which is being used to support the formwork and new concrete of the floor above. These props shall not be removed until the formwork for the new concrete has been struck.

Wedges and clamps shall be used in preference to nails. Joints in forms shall be tight enough to prevent leakage of cement paste.

Finish: — The quality of the finished surface of the concrete shall be as shown on the working drawings or as otherwise specified, and the type of formwork used shall be adequate to provide such finishes.

Ties: — The type of ties used and their position shall be such that the finish required in terms of the clause "Finish" is achieved. Tie rods are preferable to wire ties and the forms shall not be secured to the reinforcement. No corrodible tie rod or wire tie shall be allowed within the depth of concrete cover, and in the case of water-retaining or tanked structures, no removable tie rod or wire shall pass right through the concrete member.

Preparation of Formwork: — Surfaces that are to be in contact with fresh (wet) concrete shall be so treated by coating with a non-staining mineral oil or other approved material, or, in the case of timber forms, by thoroughly wetting surfaces so as to ensure easy release and non-adhesion to formwork during stripping. If any substance other than water is used, every precaution shall be taken to avoid contamination of the reinforcement.

Re-use of Formwork: — Before re-use, all formwork shall be reconditioned, and all form surfaces that are to be in contact with the concrete shall be thoroughly cleaned without unduly damaging the surfaces of the formwork.

Openings: — Where necessary for the proper placing of the concrete, temporary openings for cleaning, inspection or placing purposes shall be provided, taking cognisance of the finishes specified.

Removal of Formwork: — Formwork shall not be removed before the concrete has attained sufficient strength to support its own mass and any loads that may be imposed on it. Except where the Contractor can prove by means of cube tests, at his own expense to the satisfaction of the Department that, because of its strength development characteristics the concrete has attained sufficient strength and that shorter periods are practicable, formwork shall not be removed within shorter periods than those given in Table A. The number of cube tests required shall be equal to the number required for testing at 28 days. Where full design loads are carried, no soffit forms and props may be removed until the full design strength is attained.

In structures having, in whole or part, two or more reinforced concrete floors, props to the approval of the Department shall be provided under the soffits of beams and slabs of any floor which is being used to support the formwork and concrete of the new floor above. These props shall not be removed until the formwork for the new concrete has been struck.

All formwork props shall have been removed from under beams and slabs before the commencement of construction of brickwork thereon, unless otherwise agreed with the Department. Formwork shall be removed carefully so that shock and damage to the concrete are avoided.

TABLE A—REMOVAL OF FORMWORK (MINIMUM TIMES IN DAYS (24 hrs))

1	2	3	4	5	6	7	8	9	10
Type of structural member or formwork	Type of cement used								
	Portland cement and Portland cement 15			Rapid-hardening Portland cement* and rapid-hardening Portland cement 15			Portland blast-furnace cement		
				Weather					
	Hot or normal	Cool	Cold	Hot or normal	Cool	Cold	Hot or normal	Cool	Cold
(a) Beam sides, walls, and unloaded columns.	0,75	+	1,5	0,5	+	1	2	+	4
(b) Slabs with props left underneath	4	+	7	2	+	4	6	+	10
(c) Beam soffits with props left underneath, and ribs of a ribbed floor construction	7	+	12	3	+	5	10	+	17
(d) Slab props including cantilevers	10	+	17	5	+	9	10	+	17
(e) Beam props including cantilevers	14	+	21	7	+	12	14	+	21

* Shorter periods may be used for sections of thickness 300mm or more.
+ In cool weather, stripping times shall be determined by interpolation between the periods specified for normal and cold weather.

CONCRETE QUALITY

General: — Concrete shall comply with the requirements for "Strength Concrete" as specified. The type of aggregate and cement, and their sources of supply, shall not be altered during the currency of the Contract without the prior written agreement of or instruction from the Department.

Strength Concrete: — The Contractor shall be responsible for the design of the concrete mix and for the proportions of its constituent materials, measured as described, necessary to produce concrete that complies with the requirements specified by the Department thus:-

a) For each section of the work, the class of concrete and position on the Works, as shown on the drawings:
b) For each class of concrete:
   i) the minimum compressive strength at 28 days as shown in Table B
   ii) the maximum nominal size of coarse aggregate as shown in Table B

iii) the stump as shown in Table D
iv) the maximum cement/water ratios as shown in Table C.

At the earliest possible stage in the Contract, at least 35 (thirty-five) days before the first concrete is placed, or as otherwise agreed with the Department, the Contractor shall submit samples of the aggregates which he proposes to use on the works to the Department.

The Contractor, under the supervision of the Department, shall prepare trial mixes using these same aggregates, to establish his ability to achieve the strengths specified, and satisfactory workability of the concrete. The Contractor shall provide all necessary equipment for, and carry out tests of moisture content of aggregates at the time of preparation of the trial mixes, tests of the slump of the mixes and at the same time cast not less than six standard cubes from each mix for compression tests.

The target strengths to be achieved under trial mix procedure shall exceed the specified minimum compressive strengths by a factor which is acceptable to the Department.

The Contractor shall also, when required to do so, prove the concrete yield obtained per sack of cement by suitable measurement of batches after placing.

No structural concrete work shall be poured until trial mix procedure has been properly followed and satisfactory 7 (seven) day compression strengths achieved. (Equivalent 28 (twenty-eight) day strength = 4/3 x 7 day strength + 5 MPA).

Thereafter, the materials, preparation of and method of manufacture of subsequent concrete shall conform accurately to those used in the trial mixes. If materials vary in the course of the Contract from the samples first submitted, the Contractor shall, on the instructions of the Department, repeat the trial mix procedure and vary the proportions to attain the specified qualities.

The costs of preparation of trial mixes, with tests associated with them, shall be borne by the Contractor and must be allowed for in the pricing of the concrete.

A valid concrete test result shall be the average obtained from the testing of three test cubes of concrete in accordance with SANS Method 863.

TABLE B—CONCRETE CLASSES: STRENGTH, AGGREGATE SIZE AND COMPACTION

Class	Minimum 28 day cube compressive strength (MPA)	Maximum nominal size of coarse aggregate (mm)	Method of Compaction
50/26 50/19	50	26,5 19,0	Mechanical (see clause "Compaction")
45/26 45/19	45	26,5 19,0	
40/26 40/19	40	26.5 19,0	
35/26 35/19	35	26,5 19,0	
30/37 30/26 30/19 30/13	30	375 26,5 19,0 13,2	
25/37 25/26 25/19 25/13	25	37,5 26,5 19,0 13.2	
20/37 20/26 20/19 20/13	20	37,5 26,5 19,0 13,2	
15/37 15/26 15/19	15	37,5 26,5 19,0	Non-mechanical (See clause "Compaction")
10/37 10/26 10/19	10	37,5 26,5 19,0	

The Contractor shall be deemed to have satisfied himself, before tendering, of his ability to produce concrete of the required quality with available materials conforming to the specification, and mixed in the proportions on which his tendered rates are based. Any subsequent alterations of the mix proportions to meet these requirements shall be at the Contractors expense.

If, in the opinion of the Department, the concrete proportions are likely to lead to excessive segregation, honeycombing, bleeding or shrinkage cracking, he shall have the right to order the Contractor to amend the proportions at the Contractors own cost.

TABLE C — MAXIMUM CEMENT / WATER RATIOS FOR DIFFERENT CONDITIONS OF EXPOSURE

1	2	3	4	5
Type of structure	**Exposure Conditions**			
	Mild	**Moderate**	**Severe**	**Very Severe**
Thin sections; reinforced piles; all sections with less than 25mm cover reinforcement.	*	0.53	0.48	0.40
Moderate sections; retaining walls, piers, beams	*	*	0.53	0.43
Exterior portions of mass concrete	*	*	0.53	0.43
Concrete slabs laid on ground	*	0.53	0.48	*
Concrete protected from the weather, inside buildings, or in ground below frost level	*	*		*

* In these cases the ratio will be based on the strength for the workability desired.

Consistency and Workability: — Slump measurements taken in accordance with SANS Method 862 shall be within the limits given in Table D appropriate to the type of construction, or within such other limits as are laid down by the Department.

The concrete shall be of such workability that it can readily be compacted into the corners of the formwork and around reinforcement without segregation of the materials or excessive "bleeding" of free water at the surface.

TABLE D—SLUMP LIMITS

1	2	3	4	5
Type of construction	Slump, mm			
	Non-mechanical compaction		Mechanical compaction	
	Max.	mm.	Max.	mm.
Paving and pre-cast units	75	50	50	30
Heavy mass construction	75	25	50	20
Reinforcing foundation walls and footings	125	50	80	30
Slabs, beams, columns, and reinforced walls	125	50	80	30
Slabs and industrial floors on ground	125	75	80	50
Plain footings, caissons, and substructure walls	100	25	60	20

Ready-mixed Concrete: — This may be used subject to the approval of the Department. This approval may be withdrawn on 24 (twenty-four) hours notice to the Contractor if at any time if documents do not conform to the requirements of this Specification. Ready-mixed concrete shall also comply with the requirements of SANS Specification 878. Details of the

mix ingredients and tests thereon, the mix designs and relevant tests shall be forwarded to the Department for his approval. Ready-mixed concrete shall be cast within 3 (three) hours of placing all the ingredients in the mixing plant. Ready-mixed concrete shall be subject to the same sampling and testing at the site as that mixed on site and only the results of these tests will be regarded as valid.

TRANSPORTATION AND PLACING

Transportation: — Unless agreed with the Department, concrete shall not be pumped into its final position.

The Contractor must provide suitable runways for the distribution of concrete to the various parts of the structure and these must be solidly constructed in such a manner so as to obviate the possibility of interference with the steel reinforcement.

Placing: — Unless otherwise agreed with the Department, the Contractor shall give the Department at least 24 (twenty-four) hours notice of his intention to place concrete. No concrete shall be placed without the prior approval of the Department and without a representative of the Department being present. Concrete shall be placed within one hour of the time of its discharge from the mixer. Concrete shall not be re-tempered by the addition of water or other material. The forms to be filled shall be clean internally. All excavations and other surfaces of an absorbent nature that are to come into contact with the concrete shall be dampened with water. There shall be no free-water on the surface against which concrete is to be placed. Wherever possible, the concrete shall be deposited directly into its final position to avoid segregation and displacement of reinforcement and other items that are to be embedded. Deposited concrete shall not be so worked (whether by means of vibrators or otherwise) as to cause it to flow laterally in such a way that segregation occurs. Where possible, the concrete shall be brought up in horizontal layers of compacted thickness not exceeding 450mm and heaping shall be avoided.

Where a chute is used to convey the concrete, its slope shall be such as will not cause segregation, and a suitable spout or baffles shall be provided for the discharge of the concrete. Concrete shall not be allowed to fall freely through a height of more than 3 m, unless otherwise approved. Concrete shall not be placed during periods of heavy or prolonged rainfall.

Compaction: — The concrete shall be fully compacted by approved means during and immediately after placing. It shall be thoroughly worked against the formwork and around reinforcement and other embedded fittings without displacing them.

The concrete shall be free of honeycombing and planes of weakness. Successive layers of the same lift shall be thoroughly worked together.

The method of compaction shall be as specified. Mechanical compaction shall be undertaken by means of high frequency immersion vibrators of minimum frequency of 6000 vibrations per minute and a maximum acceleration of 4 g when under load, being capable of visibly affecting concrete over a radius of at least 500mm. Vibrators shall be inserted at about 500mm centres and withdrawn slowly to close the hole formed by the vibrator.

Non-mechanical compaction shall be undertaken by means of spading, rodding or forking.

Over-compaction resulting in segregation, surface laitance or leakage (or any combination of these) shall not be allowed.

Vibrators shall not be allowed to come within 30mm of the face of the formwork in the case of formed finishes, nor within 75mm of the face of the formwork in the case of special finishes.

Construction Joints: — Concreting shall be carried out continuously up to the construction joints shown on the working drawings or as prior approved by the Department, except that

if, because of an emergency (such as a breakdown of the mixing plant or the occurrence of unsuitable weather), concreting has to be interrupted a construction joint shall be formed at the place of stoppage in conformity with the detail shown on the drawings for construction joints generally and in the manner which will least impair the durability, appearance and proper functioning of the concrete. The Department shall approve the method adopted for forming the construction joints, one of the following methods being adopted, as relevant: —

a) Construction joints when concrete is not more than 24h old: —The surface of the concrete shall be brushed with a steel wire brush before new mortar and concrete are placed as specified in (b) below.
b) Construction joints when concrete is more than 24h but not more than 3 days old: — The surface of the concrete shall be sand-blasted or chipped with a light hammer, swept clean, and thoroughly wetted and covered with a 10mm thick layer of mortar composed of cement and sand mixed in the same ratio as the cement and sand in the concrete mixture. This mortar shall be freshly mixed and placed immediately before the new concrete is placed.
c) Construction joints when concrete is more than 3 days old: — The procedure specified in (b) above shall be followed, except that the old surface shall be prepared and kept continuously wet for at least 24h before the mortar and new concrete are placed.
d) Construction joints at tops of columns: — The procedure for brushing or cleaning specified in (a) or (b) above, as applicable, shall be followed before the steel reinforcement of the slab or floor to be cast on the columns is placed in position.

Curing and protection: — Formwork shall be retained in position for the appropriate period given in the clause "Removal of Formwork" and shall be considered as providing adequate curing on those surfaces for that period. Should this curing period still be less than that specified, alternatively, should surfaces not be cured by forms then all such concrete shall immediately be protected from contamination and loss of moisture by one or more of the following methods: —

a) ponding the exposed surfaces by means of water, except where atmospheric temperatures are low, i.e., less than 2°C,
b) covering the concrete with sand, or mats made of a moisture-retaining material, and keeping the covering continuously wet;
c) continuous spraying of the exposed surfaces with water;
d) covering with a waterproof or plastic sheeting firmly anchored at the edges,
e) using a prior approved curing compound applied in accordance with the manufacturer's instructions, provided that in this case, the presence of the compound is not detrimental to subsequently applied finishes.

Whatever method of curing is adopted, its application shall not cause staining, contamination, or marring of the surface of the concrete.

The curing period shall be at least 5 days for concrete made with Portland cement, at least 2 days for that made with rapid-hardening Portland cement and at least 7 days if Portland blast-furnace cement is used. When atmospheric temperatures are below 5° C these minimum curing periods shall be extended by 72, 36 and 72 hours respectively.

CONSTRUCTION DETAILS

Holes, Chases and Fixing Blocks: — No holes or chases other than those shown on the working drawings or approved by the Department shall be cut or otherwise formed in the concrete. No blocks for the attachment of fixtures shall be embedded in the concrete unless approved by the Department.

Pipes and Conduits: — No pipes or conduits other than those shown on the working drawings shall be embedded in the concrete without the approval of the Department. The clear space between any such pipes and the clear distance between such-a pipe and any reinforcement shall be at least 25mm or the maximum size of the coarse aggregate plus 5mm, whichever is greater. The amount of concrete cover over pipes and fittings shall be at least 25mm.

Honeycombing and Other Defects: — After removal of the forms, if the concrete shows any defect in terms of the Specification for Finishes for that concrete, the Contractor shall, on the instructions of the Department, make good the defect at his own cost, by either removing and replacing the defective concrete, or by patching, all as approved by the Department and to the standard of finish required. No remedial work shall be carried out by the Contractor without the prior approval of the Department.

Building on Concrete Footings: — No structural load shall be imposed on concrete footings until at least three days after depositing the concrete in the case of mass concrete footings and after seven days in the case of reinforced concrete footings, or as may be directed by the Department.

RECORDS: —The Contractor shall maintain written records indicating: —

a) the date on which each section was concreted, the time taken to place the concrete, and the position of that section in the Works and its construction joints;
b) daily weather conditions with temperatures being recorded by maximum and minimum thermometers and
c) the nature of samples and dates on which they were taken. In the case of cubes these shall also state the identification marks, test results and age, minimum strength required and position of parent concrete.

TESTS

Compressive Strength: — During the time in which each class of concrete, having a specified 28 day compressive strength equal to or greater than 20 MPA, is being placed, samples of the concrete shall be taken from the point of deposit at the rate of at least one sample from each 5m³ of concrete placed in columns, and from each 30 m³ or part thereof of concrete placed elsewhere, but in either case, nevertheless at least once a week. A group of at least three 150mm test cubes shall be made from each sample for testing at 28 days age. If the Contractor plans to execute further work which relies on previously completed work for support but for which the results of 28 day tests are not available, he is to prove the strength of that concrete by taking and testing at 7 days age an equal number of test cubes to that which is to be tested at 28 days age, prior to the commencement of the planned further work.

The cost of the necessary extra test cubes and testing will be for the Contractor's account. Each group of test cubes shall be deemed to represent the whole of the concrete from which sample was taken and shall be identifiable with the concrete.

The Contractor shall provide, at his own expense, sufficient moulds to keep pace with the rate of concreting. He shall also perform all tasks in respect of compressive strength testing except the actual crushing.

If ready-mixed concrete is used, site testing as specified herein shall still be undertaken, and only the results of such site testing shall be considered in determining the acceptance or otherwise of the concrete.

Grading Analysis: — If so directed by the Department, a grading analysis shall be made for each 40m³ of fine aggregate to be used and for each 75 m³ of the coarse aggregate to be used. The analysis shall be made by the method given in SANS Specification 1083.

Determination of Consistency: — When the slump test is used to measure the consistency of the concrete mix, it shall be carried out by the method given in SANS Method 862 with samples taken in accordance with SANS Method 861.

Costs of Tests: — to concrete, trial mixes, cement, aggregates, water and reinforcing steel shall be borne by the Contractor. The Contractor shall also bear the costs of any other tests (including load tests), which are required as a result of failure on the part of the Contractor to meet the requirements of the Specification.

An item against which the Contractor may allow for all costs in connection with tests on concrete cubes has been included elsewhere in these Bills of Quantities.

Testing Authority: — The crushing of cubes and testing of other samples except in the case of the clause "Determination of Consistency" shall be undertaken by an independent Authority as approved by the Department. The Contractor shall arrange with the Authority that copies of the results of all tests are sent direct to the Department.

ACCEPTANCE CRITERIA FOR STRENGTH OF CONCRETE: — Should any test result obtained from a set of three test cubes of concrete of a specific grade that have been made and tested as specified show that the strength is more than 3 MPA below the specified strength, the concrete represented by such results shall be deemed to have failed to meet the Specification. Should an examination carried out in terms of the clause "Procedure in the event of failure" satisfy the Department that the structural adequacy and durability of that part of the structure where the concrete concerned has been used, is not impaired, the concrete will be acceptable. The Contractor will however be required to review the mix design and any other factors influencing the quality to ensure that further concrete is acceptable.

Where three or more consecutive valid test results (i.e., results of sets of three test cubes that have been made and tested as specified) become available, the following criteria shall apply: —

a) The average of any three consecutive valid test results obtained on concrete of a specific grade must exceed the specified strength by at least 2 MPA.
b) If the criterion given in (a) above is not met but the average is at least equal to the specified strength, the concrete cast will be acceptable but the Contractor will be required to adjust the mix design and standard of control.
c) Should the average result be less than the specified strength, an examination must be carried out in terms of the clause "Procedure in the event of failure" on that part of the structure in which concrete represented by the result has been used.

Alternatively, should a concreting operation be of such size or the testing be of such frequency that thirty or more valid test results (i.e., results of sets of three test cubes that have been made and tested as specified) become available within three months, the Contractor may choose, subject to the approval of the Department, to have the results assessed statistically. In such a case, the average of all the test results of a specific trade of concrete at *any stage* must exceed the specified strength by at least 1,7 standard deviations, failing which the Contractor will be required to adjust the mix design to ensure compliance with this criterion.

PROCEDURE IN THE EVENT OF FAILURE: — If after the evaluation of the test results in terms of the clause "Acceptance criteria for strength concrete" an examination of the concrete in the structure is necessary, one or more of the following procedures in the sequence given may be adopted at the discretion of the Department, and for the account of the Contractor, to determine the acceptability or otherwise of the concrete in that particular part of the structure: —

a) An assessment of the stress level in the structure concerned in relation to the test result obtained.

b) Non-destructive testing, subject to the availability of similar concrete of proven acceptable quality in comparable members in the same construction as a reference.

c) The testing of drilled cores in accordance with the relevant SANS Standard Methods.

d) Full scale load tests in accordance with Section 6 of SANS Code of Practice 0100: Part II.

Where load tests are, in the opinion of the Department, unsuitable or impracticable, and if an examination carried out in terms of the above does not show the concrete strength

to be acceptable, or if a tested portion of the structure fails to pass the tests, the Contractor shall, on the instructions of the Department, replace or strengthen by approved means: —

a) each portion that failed or contains concrete that failed, as relevant, and
b) any other portion, irrespective of strength, the functional purpose of which is affected by the portion or concrete referred to in (a) above.

NON-STRUCTURAL PRESCRIBED MIX CONCRETE: — Concrete for non-structural purposes shall be "Prescribed mix concrete" produced in accordance with the requirements indicated in the table below, and the Contractor is also referred to the foregoing Preambles insofar as they apply: —

TABLE E – PRESCRIBED MIX CONCRETE FOR NON-STRUCTURAL PURPOSES

Class of Concrete	Estimated minimum compressive strength in MPA at 28 days	Maximum nominal size of coarse aggregate in mm	Proportion of Constituents		
			Cement (Parts)	Fine Aggregate (Parts)	Coarse Aggregate (Parts)
A	1	37,5	1	4	8
B	15	19,0	1	3	5
C	20	19,0	1	2 ½	3 ½

Cement and aggregates shall be mixed by volume and the contents of a 50 kg sack of cement shall be taken to be 0.033 m^3

The cement / water ratios and the maximum and minimum slumps for concrete shall be as previously listed in Tables C and D.

The Department shall have the right to vary the proportions of the constituents in any of the prescribed mixes as necessary to obtain the required compressive strength, optimum density and workability of the concrete. Any variation in the rates of the concrete will only be considered if the proportion of cement to the total volume of aggregate, in each case, is varied from that Specified.

Notwithstanding any requirements previously described, the Department may permit certain items of non-structural concrete in small quantities to be mixed by hand.

Where concrete is mixed by hand, the coarse aggregate shall be spread out on a timber, concrete or metal platform in a flat heap, the sand-then spread evenly over the heap, followed by the cement also spread evenly, and the whole thoroughly mixed by shovelling from the centre to the side to form a ring, then back to the centre and again to the side. Water shall then be poured into the ring and the materials mixed into it and then back into the ring, the remainder of the water then added slowly as materials are mixed into it. Mixing shall continue until the colour is uniform and the consistency the same throughout the pile.

"NO-FINES" CONCRETE: — shall consist of one part of cement to eight parts of 19mm aggregate (1:8— 19mm stone) with a water/cement ratio of approximately 0, 46. This water/cement ratio may be varied slightly to suit conditions on approval by the Department.

The quantity of water used shall be just sufficient to form a smooth grout, which shall completely coat every particle of aggregate, and also to ensure that the grout is just wet enough to form a small fillet at each point of contact between the stones. 'No-fines" concrete mixed with excessive water, which results in a thin grout which drops off the aggregate, will be rejected.

"No-fines" concrete shall be placed in its final position within 20 minutes of mixing and shall be placed in continuous horizontal layers. "No-fines" concrete shall be spade worked sufficiently to ensure that it fills the forms but vibrating, tampering or ramming will not be permitted.

BREEZE CONCRETE: — shall consists of one part cement to eight parts clean dry furnace ashes, the ashes being free from all coal or other foreign matter and graded up to particles which will pass a 26. 5mm ring from a minimum which passes a 4.75mm mesh. The finer materials from the screening to be first mixed with the cement into the mortar and the ashes added afterwards and thoroughly incorporated. The breeze concrete is to be mixed in batches not exceeding 0, 1 in 3 and each batch is to be immediately placed in position. The ashes for breeze concrete are to be obtained in an unscreened state and are to be kept dry so that sufficient fine material will be obtained from the screening to make the mortar.

FINISHES TO IN-SITU CONCRETE

Formed Finishes: — are the concrete surface finishes developed using formwork and whose standard of finish in each class shall be as described.

The Department shall be informed by the Contractor of any defect in terms of this Specification, and no remedial work shall be carried out by the Contractor without the prior approval of the Department. Any defect shall be made good at the Contractor's expense by either removing and replacing the defective concrete, or, in certain instances only, by patching, all as approved by the Department and to the standard of finish required.

Class F1 Ordinary Finish: — Formwork panels shall be of such quality that upon removal, the concrete is true and even, free from fins and recesses greater than 5mm size, honeycombing, large air holes and the like. Bolt holes shall be filled if so required by the Department.

Class F2 Smooth Finish: —This class of finish requires a high standard of concrete work, formwork and technique.

Concrete placed in any one structure to give this finish shall be made from cement and aggregates from the same source, and similarly, the grading of the aggregate shall be kept constant.

Formwork shall be metal or wrot timber in a new condition designed and constructed to suit the particular job in hand and with shutter bolts and joints between panes in a pattern approved by the Department. Joints between panels shall be watertight, but the use of sealing tape, which marks the concrete, shall not be permitted.

Construction joints shall be in the position and of the detail shown upon the working drawings. Should the Contractor wish to incorporate further construction joints or amend the position of those shown to suit his own requirements or technique, this may be allowed provided that all design considerations are met, that the prior approval of the Department is obtained and that any extra costs are borne by the Contractor. In the case of horizontal construction joints, the top edge of the concrete on the Class F2 smooth finish side is to be struck true and level with a trowel.

Special care shall be taken to ensure that forms are clean of all pieces of tying wire, nails and other debris at the time of concreting.

The standard of finish shall be such that, upon removal of the formwork, no further treatment, other than treatment of bolt holes if required shall be found necessary to provide a straight, smooth and uniform finish of good quality and consistent colour and texture, free of all honeycombing and large air holes.

UNFORMED FINISHES: — are those concrete surface finishes developed without the use of formwork -

Class U1 Ordinary Finish: — Immediately after placing, the concrete shall be finished by screeding with the edge of a wooden board of straight and true line and working between guides set accurately to level. No mortar shall be added and noticeable surface

irregularities caused by the displacement of coarse aggregate shall be made good by re-screeding after removing or tamping down the offending aggregate.

Class U2 Wood Float Finish: — The concrete surface shall first be brought to the standard Class U1 ordinary finish and then floated with a wood float. Floating shall be started as soon as the screeded finish is stiffened sufficiently and the bleed water has evaporated or been removed and it shall be the minimum necessary to produce a surface free from screed marks and uniform in texture.

Class U3 Steel Trowel Finish: — The concrete surface shall first be brought to the standard of Class U2 wood float finish with floating being continued until a small amount of mortar without excess water is brought to the surface and then when the floated surface has hardened sufficiently to prevent any more excess fine material from being drawn to the surface, troweling with a steel trowel. Troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense uniform surface free from blemishes and trowel marks. Gradual surface irregularities shall not exceed 5mm over any 3m. The sprinkling of sand and/or neat cement on the surface to absorb excess moisture shall not be permitted.

Class U4 Power Float Finish: — The concrete surface shall first be brought to the standard of Class U1 ordinary finish using wooden screeding boards or steel rollers. After evaporation or removal of all bleed water and immediately the concrete is stiff enough to support the machine the surface shall be closed with a mechanical power float and then finished with a mechanical power trowel. The texture of the finished surface shall be either non-slip or polished as shown on the drawings. Irregularities shall be of long wavelength not exceeding a curvature of 2mm in 600mm. Under no circumstances shall sand and/or neat cement be sprinkled over the surface either to absorb excess moisture or to fill surface blemishes or irregularities. Power floats and trowels shall be operated by skilled operators.

TOLERANCES: — Clause 6 of SANS Specification 1200G refers. Unless otherwise agreed by the Department, 'Degree of Accuracy' shall apply to all concrete work and steel reinforcing.

SUPERVISION: — The construction of all concrete work shall, at all times, be under the supervision of a competent person experienced in the production and placing of high-grade concrete. He shall personally supervise all work relating to the concrete construction and pay special regard to: —

a) The quality, testing and mixing of materials.
b) The finish, stability and cleanliness of formwork and excavations.
c) The cleanliness, correct positioning and maintenance in position of steel reinforcement.
d) The transporting, placing, compacting and curing of the concrete. The construction and stripping of formwork.
e) The production of samples, test cubes, slump and other tests.

GENERAL

Measurement and Payment: — The provisions of Clause 8 of SANS Specification 1200G will NOT apply and the system of measurement that is adopted in these Bills of Quantities is the only system of measurement that will be recognised in this Contract.

No deductions have been made for pipes not exceeding 200mm internal diameter, reinforcement, conduits, structural steel, bolts and the like.

Rates for Concrete: — are to include for mixing, handling and depositing (by hoisting or lowering) in the forms. Rates for items of reinforced concrete are to include for thoroughly working and packing around the steel reinforcement. All reinforcement, except where otherwise described, has been measured separately.

Rates for concrete surface beds are to include for laying in suitable size panels not exceeding 20m^2 or as may be directed. The Contractor is to allow in his pricing of the concrete for all construction joints.

Striking off and Curing: — of concrete slabs and surface beds has been measured separately. The rates for all other items of concrete including stairs and landings and concrete bindings, are, except where otherwise described, to include for all necessary striking off of surfaces and curing.

The rates for items of striking off and curing top surfaces of concrete shall, unless otherwise described, apply to level surfaces.

Where exposed sloping surfaces of concrete do not exceed the limits of pitches laid down for the measurement of back shuttering, the striking off and curing of the sloping top surfaces has been measured in the case of concrete slabs and surface beds, and in other-cases provision has been made for dressing the concrete surfaces to splay.

Where items of striking off and curing are described as to falls or ramps this shall include cross-falls, etc.

The rates for striking off and curing of surface beds formed in panels must also include for all necessary temporary formwork in forming the panels.

Rates for Formwork: — are to be for use and waste only (except where described as "permanent") and are to include for fitting together in the required forms, propping, strutting, shoring, wedging, plumbing and fixing to true angles and surfaces, cambering formwork to slabs and beams where required, preparation and treatment of surfaces as necessary to ensure easy release during stripping, reconditioning as necessary before re-use, providing necessary temporary openings for the purpose of cleaning, inspection and placing of concrete, and for all straight cutting, splayed edges, intersections, notching and narrow widths, including waste and properly fitting at intersections, maintaining in position for periods as directed and for striking and removing.

Rates for items of formwork to soffits of slabs and to sides and soffits of beams, lintels and the like are to include for horsing exceeding 1,5m and not exceeding 4,5m high unless otherwise stated in the items.

Rates for formwork to soffits of stairs and landings are to include for all necessary horsing.

Rates for Permanent Formwork: — are to include for leaving in all formwork, props, etc. as permanent formwork shall be regarded as not being recoverable.

Rates for Steel Fabric Reinforcement: — are to include for lapping the reinforcement at all edges, as specified, for all cutting and waste, notching, etc. bending where required, wiring together at laps and for maintaining in position during placing of concrete.

Rates for Steel Bar Reinforcement: — are to include for all cutting, bending, hooked ends, wiring together at passing points, hoisting or lowering to the required levels, fixing in accordance with the detail drawings, cover blocks and maintaining in position during placing of concrete. The mass of mild and high yield stress steel bars shall be based on the values shown in Table El of SANS Specification 920— Appendix E (with no allowance being made for rolling margin and waste).

The mass of the binding wire required for fastening the reinforcement together is not included in the mass of the reinforcement. Provision for the cost of this wire shall be deemed to have been made by the Contractor in calculating the unit rate for the net mass (i.e. excluding the mass of binding wire) of the reinforcement.

4. BRICKWORK

SAND: — shall comply with the requirements of SANS Specification 1090, washed where necessary and screened through a 2360 micrometer mesh sieve.

CEMENT: — shall be Portland cement of normal setting quality complying with SANS

Specification 471 or Portland cement 15 complying with SANS specification 831. Cement containing more than 15 % blast furnace slag will not be permitted to be used.

LIME: — shall be hydrated lime complying with SANS Specification 523.

WATER: — shall be clean and free from injurious amounts of acids, alkalis, and other organic substances. If so required by the Department, the suitability of the water shall be proved by tests carried out by an approved laboratory.

CEMENT MORTAR: — unless otherwise described, shall be composed of one part by volume of cement to five parts by volume of sand.

COMPO MORTAR: — unless otherwise described, shall be composed of one part by volume of cement, one part by volume of lime to ten parts by volume of sand.

STRENGTH MORTAR: —where required, shall be of the class specified and as defined in Table C-I of SANS Code of Practice 0164—Part I.

MIXING OF MORTAR: — the materials are to be mixed dry on a non-absorbent and close jointed timber or iron platform until the mixture is of uniform colour with water added and the mixture turned over until the ingredients are thoroughly incorporated.

No cement mortar that has once commenced to set will be allowed to be used. Mixing platforms are to be cleaned and old mortar removed before any new batch of mortar is prepared for mixing. No mortar mixing by adding additional materials is permitted after 5 (five) hours.

TESTING OF STRENGTH MORTAR: — During the time brickwork is being laid samples shall be taken of the mortar being used as shall be directed by the Department. A group of three 70mm x 70mm x 70mm test cubes shall be made from each sample for testing at 28 days of age. Each group test cubes shall be deemed to represent the whole of the batch from which the sample was taken and shall be identifiable with the batch.

The testing shall be undertaken by an independent firm or institution nominated by the Contractor to the approval of the Department. An item for the testing of mortar cubes has been provided elsewhere in these Bills of Quantities.

BURNT CLAY COMMON BRICKS: — shall comply with SANS Specification 227 and are to be good quality, sound, hard, well burnt bricks, uniform in size and shape.

A sample load of bricks is to be approved by the Department and all subsequent loads are to be equal thereto.

BRICKS FOR FOUNDATIONS: — are to be as above but extra hard burnt bricks.
Reject facing bricks may be used in lieu of extra hard burnt foundation bricks provided they are equal to a sample to be submitted to and approved by the Department. These bricks are also to be used for septic tank walls.

BRICKWORK: —unless otherwise described is to be in burnt clay common bricks and wherever practicable is to be in stretcher bond with the skins tied together with and including galvanized crimped wire wall ties in accordance with SANS Specification 28. The wire ties are to be of sufficient length to allow each end to be built into brickwork built into every fourth course and spaced at 450mm staggered centres (seven ties per square metre). The bricks are to be well wetted before being laid and the course of bricks laid last is to be well wetted before bedding the next course of bricks upon it. The brickwork is to have all perpends flushed up solid and each course is to be laid on a solid bed of mortar. No false headers are to be used. Whole bricks are to be used except where bats or closers are legitimately required to form bond.

Unless otherwise described one brick walls are taken at a nominal thickness of 230mm.

The joints of all walls to be plastered are to be raked out as the work proceeds to form key for plaster. All walls are to be carried up regularly so that no part is built more than 1,2m higher than the adjoining walls.

Mortar joints generally are not to exceed 10mm thickness unless otherwise indicated on the drawings. If a specific brick scale is indicated on the drawings, either drawn or written, it must be adhered to.

Solid bricks to X-Ray Room walls are to be used. If hollow core bricks are used, these are to be grouted up solid.

HOLLOW WALLS: — are to be formed of two thicknesses of brickwork as specified with cavity between, tied together, unless otherwise specified, with and including A.I.S.I. Type 304 stainless steel wire butterfly type wall ties in accordance with SANS Specification 23, of sufficient length to allow each end to be built into brickwork, built into every fourth course and spaced at 450mm staggered centres (seven ties per square metre). Cavities are to be kept clear of all rubbish, mortar droppings and projecting mortar.

BRICK LININGS TO CONCRETE: — unless otherwise described are to be tied to concrete with and including A.I.S.I. Type 304 stainless steel wire wall ties complying with SANS Specification 28 with one end embedded is to deep into concrete and other end built into the brick joints and spaced not less than seven ties per square metre.

REINFORCED BRICK LINTELS: — unless otherwise detailed are to be constructed in accordance with KZN Public Works Type Drawing.

PRE-CAST AND PRE-STRESSED CONCRETE LINTELS: — where specified, are to be of approved manufacture and the Contractor is to provide the Department with a certificate issued by the manufacturer certifying that the lintels are adequate for the purpose in terms of span, loading and number of courses and construction of brickwork above the lintel. The manufacturer is also to specify the minimum bearing required at each bearing end and the nature and period of temporary propping required. Rates or pre-cast pre-stressed concrete lintels are to include for any cement mortar filling required and for temporary propping in accordance with the manufacturer's instructions.

BAGGING DOWN BRICKWORK: — shall be carried out when the mortar in joints is still soft by rubbing over with wet rough sacking until all joints and crevices are evenly filled, including additional mortar if necessary to obtain an even surface or, when the mortar in joints is set, by rubbing over as described but including cement grout as necessary to fill up the joints and crevices.

CRAMPS: — for timber door frames shall be 1.6mm thick galvanized hoop iron 32mm wide with one end turned up 50mm and twice screwed to stile of frame and built 450mm deep into wall with other end turned up into brick joint and cranked as necessary where built into cavity wall. Cramps shall be.built in approximately 330mm from top and bottom of stile and intermediately at not exceeding 825mm.

TIES TO WALL PLATES, RAFTERS, ETC.: — shall be 1.6mm thick galvanized hoop iron 32mm wide and at least 1500mm long with one end turned up and built in not less than ten courses deep into brickwork or embedded in concrete beams or slab and with end left projecting and wrapped around timber rafter and spiked to timber wall plate. Where ties are embedded to concrete beam or slab, they must be wrapped around the bottom steel bar reinforcement of the beam or slab.

WELDED MESH BRICK REINFORCEMENT: — shall be 55mm, 80mm, 155mm or 235mm wide consisting of two 3.55mm main high tensile steel wires at 50mm, 75mm, 150mm or 230mm centres respectively with 2.80mm high tensile-steel cross wires electrically welded at 300mm centres, lapped 150mm at end joints, 75mm at angles and built 110mm into connecting walls. No allowance has been made for laps.

BITUMEN EMULSION WATERPROOFING TO BRICKWORK: — The inner thickness of external superstructure walls whether hollow or solid, behind facing bricks, is to be bagged and painted with two coats of approved bitumen emulsion waterproofing compound.

FACING BRICKS. PAVING BRICKS, QUARRY TILES, ETC.: — Facing bricks shall comply with SANS specification 227. Facing bricks, paving bricks, quarry tiles, terra cotta grille blocks, etc. are to be of the types and colours specified, specially selected, free from blemishes, square on all faces, uniform in size, shape and colour and equal to a sample to be deposited with and approved by the Department.

Special care must be taken to preserve the arrases and faces of facing bricks, paving bricks, quarry tiles, etc. during transit and handling.

FACED BRICKWORK: — Facing bricks shall be sorted to ensure proper mixing of the bricks within the colour range of each type of facing bricks. Sudden changes in the general colour of faced brickwork in any one type of facing brick will not be acceptable. Sand used in mortar for faced brickwork is to be clean washed sand and sand from the same source is to be used throughout to maintain a uniform appearance. Faced brickwork is to be pointed as specified as the work proceeds. Keyed-in joints are to be formed with a round jointing tool and square recessed joints are to be approximately 6mm deep formed with a square jointing tool. All perpends are to be accurately kept. The bond is to be broken, if necessary, in the centre of panels above and below windows, above doors, between openings and in the centre of sides to piers. No broken bond will be allowed at reveals or quoins. All cutting to face bricks is to be done with a carborundum or other approved high-speed brick saw. Faced brickwork is to be protected from injury, mortar splashes, etc. and cleaned down with spirits of salts and scrubbed down with water at completion to the approval of the Department.

PAVING BRICKS AND QUARRY TILES: — unless otherwise described are to be pointed as the work proceeds with 6mm wide keyed-in joints. Paving bricks and quarry tile paving, sills, etc. are to be protected from injury, mortar splashes, etc. and cleaned down with spirits of salts and scrubbed down with water at completion to the approval of the Department.

FIBRE CEMENT SILLS: — are to be of approved manufacture without fixing lugs, even in shape, uniform in colour, free from cracks, twists and other defects, in single length between reveals and of the thickness and colour specified and equal to approved sample.

RATES

Brickwork Generally: — Rates for brickwork are to include for hacking the face, or raking out the joints, of brickwork where necessary to form key for plaster, etc. and for plumbing angles and surfaces, all square cutting, wedging and pinning against columns, beams, slabs, etc. for all waste in cutting and wire ties required in tying skins together as described.

Rates for hollow walls are to include in addition to the above for keeping the cavities clean and free of mortar droppings and for butterfly type wall ties, all as described.

Where items are described as cut and pinned, built in, bedded, wedged and pinned, etc. rates are to include for grouting in or bedding solid with 1:3 cement mortar, unless otherwise stated.

Where window units, etc. are described for building in as composite, rates are to include for assembling of units as required and, unless otherwise described, for tap screwing to coupling mullions or transoms, including holes:

Faced Brickwork, etc.: — Rates for all fair and faced brickwork, brick paving, grille block walls and the like are to include in addition to the foregoing for building or laying to true surfaces and angles, all fair square cutting and fitting and cleaning down to approval at

completion.

Rates for brick sills, copings, steps, margins, thresholds and the like shall include for fair ends and angles unless different bricks or tiles are used or special cutting is required.

Rates for items described as "Extra over ordinary brickwork" are to be for the extra cost of the facing bricks specified over common brickwork built in stretcher bond, and are to include for building in cement mortar consisting of one part cement to five parts clean washed sand and for pointing as described.

Rates for items described as "Labour and Material" are to be for the full cost of the facing bricks specified, and otherwise as above described.

Rates for all cut face brick linings are to include for cutting and bonding at ends.

Quarry Tiles: —Rates are to include for all square cutting and fitting, bedding and jointing in cement mortar consisting of one part cement to three parts clean washed sand, for pointing as described as the work proceeds and cleaning down to approval at completion.

Rates for treads, sills, copings, cappings, skirtings etc. are to include for pointing to exposed edges, ends and projecting soffits.

Air Bricks: — Rates for air bricks and air vent, gratings are to include for forming openings through the walls, for all necessary jack arches and turning pieces, for plastering all round the openings in cement mortar, and where in hollow walls, for building cavity solid all round in addition.

Fibre Cement Sills: — Rates are to include for all square cutting, waste, and fitting and for bedding in an approved epoxy adhesive.

Terra Cotta Grille Blocks: — Rates are to include for all square cutting and waste and fitting, bedding and jointing in cement mortar consisting of one part cement to three parts clean washed sand and for pointing with keyed in joints on both faces and into reveals of openings as the work proceeds.

5. WATERPROOFING

GENERAL: — All measurements are nett — no allowance being made for laps in sheet materials or for waste in cutting.

WORKMANSHIP: — All work is to be carried out to the approval of the Department by skilled and qualified workmen and in accordance with the methods prescribed in SANS Code of Practice 021 for waterproofing of buildings.

All work is to be executed in accordance with the instructions issued by the manufacturer of the material being used. Roof coverings and linings are to be laid to the falls, cross falls, etc. provided in the screeds or other surfaces to which they are to be applied.

Surfaces to be waterproofed are to be dry and cleaned of all dust, chips, etc. immediately prior to the commencement of this work and are to be free of any contaminating substances or projections that may damage the waterproofing materials being used.

POLYETHYLENE SHEETING: — is to comply with SANS Specification 952 and bear the SANS mark. The sheeting is to be laid with a minimum lap of 150mm, unless otherwise specified, at angles and junctions with laps sealed in accordance with the manufacturer's instructions.

MASTIC ASPHALT ROOFING: — is to conform to SANS Specification 297 and is to be laid hot in two or three layers, as stated, with each layer of minimum 4mm thickness and laid to break joint with the underlying layer by not less than 150mm.

Prior to the commencement of any work, the specialists who lay the mastic asphalt roofing are to satisfy themselves as to the acceptability of the surfaces upon which the mastic asphalt is to be laid, as the said specialists will be held fully responsible therefore.
Mastic asphalt to surfaces not exceeding 10-degree slope is to be laid in two layers on and including one layer of approved reinforced waterproof building paper lapped 75mm at all edges. Rates are to include for all cutting and waste on building paper.

Mastic asphalt to surfaces exceeding 100 and not exceeding 200 slope is to be laid in two layers on surfaces which have been hacked, grooved or scoured to provide an adequate key. Rates are to include for the necessary preparation of the surfaces.

Mastic asphalt to vertical surfaces and surfaces exceeding 20-degree slope is to be laid in three layers on and including any necessary expanded metal lathing securely fixed to the surfaces to prevent creeping. Where vertical surfaces do not exceed 300mm in height the surfaces to receive mastic asphalt may alternatively be prime coated with a latex based bitumen emulsion primer prior to the application of the mastic asphalt.

Anile fillets to all internal angles are to be run in one operation.

Finishing coats of bituminous-based aluminium paint on mastic asphalt roofing have been measured separately.

FLEXIBLE GLASS-FIBRE REINFORCED POLYESTER WATERPROOFING: — shall be of the type specified, or other approved, supplied and laid in-situ by a specialist sub-contractor, all to the approval of the Department and shall carry a written 10 (ten) year guarantee.

The waterproofing applied in-situ shall consist of one layer of three-ply bituminous felt underlay bonded to the substrate and covered with flexible glass-fibre reinforced polyester waterproofing comprising a chopped strand glass-fibre mat having a minimum mass of 450g / m^2, impregnated with flexible unsaturated polyester resin and finished with two coats of abrasion-resistant flexible unsaturated polyester surface coating which shall not show any sign of the glass-fibre reinforcement. The total mass of the waterproofing (excluding the bituminous felt underlay) shall be not less than 1.8kg / m^2.

Chopped strand glass-fibre mat reinforcement is to comply with the requirements of SANS Specification 419.

All unsaturated polyester resins are to be suitable for their intended use and comply with SANS Specification 713 and are to be ultra-violet ray stabilised.

All flexible glass-fibre reinforced polyester waterproofing is to be finished to approved opaque colours (excluding red or orange tints), is to be properly cured, and is to be free from porosity, blisters, cracks, surface crazing or other defects which may affect its appearance or its performance, with the surface colours consistent throughout.

Samples of flexible glass-fibre reinforced polyester waterproofing are to be submitted to and approved by the Department and all work executed is to be equal to the approved samples.

EXPANSION JOINT SEALANTS: — Polysulphide sealants, where specified, are to be approved polysulphide sealants complying with SANS Specification 110 Type 2, well compacted into joint.

Rates are to include for priming joints where recommended by the manufacturer of the sealant being used with a suitable and approved primer.

All work is to be executed by the manufacturer of the material, or other specialist firm, all in accordance with the manufacturer's instructions.

RATES: — for all roofing and linings are to include for cleaning and preparing the surfaces to be waterproofed as before described, for protecting from damage and cleaning down, flood-testing if required and handing over in an acceptable and guaranteed watertight condition at completion.
Rates for sheet waterproofing materials are to include for all dressing, bending, narrow widths, angles, intersections, cutting and waste and where applicable for the extra material required for lapping and for sealing laps as described.

Rates for roofing described as laid on "flat" roofs are to include for laying to slopes not exceeding 100mm from the horizontal.

6. ROOF COVERINGS

CONCRETE ROOFING TILES: — shall conform to SANS Specification 542. The tiles are to be of pattern and colour specified and is to be even in thickness, uniform in shape and colour and free from cracks and blemishes. The tiles are to be laid to "straight bond" in accordance with SANS Code of Practice 062 with vertical joints and bottom edges of each course ranging perfectly straight.

Unless otherwise specified each tile in every third course, all tiles in eaves and ridge courses and tiles in every course on each side of hips and valleys shall be secured with copper clout headed nails driven into the battens or with approved non-corrodible tile clips and nails in accordance with the manufacturer's instructions. Where nail holes in tiles have been cut off at hips, valleys, top edges, etc. new holes are to be drilled.

All ridge and hip cappings are to be of the types specified and of colour to match the roofing tiles. The cappings are to be bedded, jointed, pointed and torched up over roofing tiles in 1:3 cement mortar tinted to match the tiles. Where cappings having butt jointed ends are specified, an approved damp proof course conforming to Type C of SANS Specification 952 is to be fixed under, laid over the roofing tiles in accordance with the manufacturer's instructions.

Barge cappings are to be of the types specified and of colour to match the roofing tiles. The barge capping tiles are, unless otherwise specified, to be bedded, jointed, pointed and touched up over roofing tiles in 1:3 cement mortar tinted to match the tiles with every tile drilled and secured with copper clout headed nails to timber barge boards or bearers (elsewhere measured).

Concrete tiles to residential units in non hail area's are permitted.

"CHROMODEK" ROOFING SHEETS: - Shall be the secret fixed type, supplied with all fittings in full-length sheets in the profile and colour as specified. Sheets shall be a minimum of .58mm and maximum of .8mm thickness. When .58 thick sheets are used, purlin spacings shall be a maximum of 1.2mtr¢ and maximum 1.5mtr¢ for .8 thickness. Sheets shall leave the factory in the specified colour and any scratches etc., due to handling are to be 'touched up' on site after installation. All fixings, valleys, cappings and securing clips shall be to manufacturers' recommendations and no variations shall be accepted without prior approval from the department.
0,58mm thick roof sheeting for purlins up to 1,2m spacing and 0,8mm thick roof sheeting for purlins exceeding 1,2m – 1,5m spacing.
In area's up to 30Km from the coast, metal roof sheeting to be 0,58mm thick with special corrosion protection as supplied in " Global- Duro" roofing sheets. All other area's to be 0,58mm as "Global-Tech corrosion protection. 0,58mm "Klip Lock 700 " or "Craflock " and 0,8mm " Brownbuilt ". (0,8mm is recommended for high rainfall and snow fall area's due to deeper trough.)

RATES: — for roof coverings, are to include for all necessary half tiles at verges and for all square cutting and waste at verges, abutments, and top and bottom edges and to both sides of ridges.

Rates for cappings, etc. are to include for all short lengths, cutting, waste and fitting at intersections.

All measurements are nett. No allowances have been made for overlaps.

CORRUGATED IRON ROOFING, CLADDING AND FITTINGS: — are to be of an approved brand and are to be manufactured from galvanized steel sheets of the thickness specified after galvanising and having a galvanized coating of "Iscor Coating Designation Z275" for inland areas and 'Z600" for coastal areas as specified.

Roofing, etc. shall be lapped one and a half corrugations at sides and 30mm at ends unless otherwise specified. Roofing, etc. shall be fixed to timber purlins, rails etc. with standard galvanized drive screws 65mm long and to steel purlins, etc. with 8mm galvanized hook bolts of the lengths stated.

Each screw or bolt shall be fitted with one lead washer and one bituminous felt washer and shall be spaced not less than one screw or bolt to every alternate corrugation across the width at end laps and ends of sheets and at each intermediate purlin or rail.

Rates for roofing, cladding and fittings are to include for: —
a) Fixing as described.
b) Bedding washers in an approved mastic sealing compound
c) Coating projecting ends of hook bolts and nuts with bitumen after fixing
d) All square notches, square cutting and waste, laps, fitting and drilling. All measurements are nett. No allowance has been made for laps.

FLUTED STEEL ROOFING, CLADDING AND FITTINGS: — are to be approved galvanized fluted steel sheets and fittings manufactured from galvanized steel sheets of the thickness specified after galvanising

(a) **Galvanized steel sheets and fittings**: — are to be manufactured from galvanized steel having a galvanized coating of "Iscor Coating Designation Z275" for inland areas and of "Z600" for coastal areas as specified with the sheets having a plain galvanized finish and the fittings an embossed galvanized finish.
Roofing, etc. shall be fixed to timber purlins, rails, etc. with standard drive crews of the lengths stated and to steel purlins, rails, etc. with 8mm galvanized hook bolts of the lengths stated. Each fixing screw or bolt shall be fitted with washers as recommended by the manufacturer of the roofing

Vertical cladding shall be fixed with broad flutes externally - unless otherwise described - to timber rails with standard galvanized drive screws 50mm long and to steel rails with 6mm diameter x 25mm long galvanized sheet bolts. Each fixing screw or bolt shall be fitted with washers as recommended by the manufacturer of the cladding including drilling steel rails as necessary.

(b) **Baked enamel finished galvanized steel sheets and fittings**: — are to be manufactured from un-passivated galvanized steel having a galvanized coating of "Iscor Coating Designation Z275" and finished where described in the items, with approved factory applied baked enamel finish of colours to be selected by the Department.

Roofing, etc. shall be fixed to timber purlins, rails, etc. with sherardised or stainless steel drive screws of the lengths stated and to steel purlins, rails, etc. with 8mm diameter sherardised or stainless steel hook bolts of the lengths stated. Each fixing screw or bolt shall be fitted with washers as recommended by the manufacturer of the roofing.

Vertical cladding shall be fixed with broad flutes externally, unless otherwise described, to timber rails with sherardised or stainless steel drive screws 50mm long and to steel rails with 6mm diameter x 25mm long sherardised or stainless steel sheet

bolts. Each fixing screw or bolt shall be fitted with washers as recommended by the manufacturer of the cladding including drilling rails as necessary.

(c) **Generally**: — where sheet lengths are in excess of 12m these have been measured separately.

Roofing, etc. shall be lapped one flute at sides and 230mm at ends unless otherwise specified. Fixing roofing sheets are to be spaced one every crest along purlins at top and bottom edges of roof slopes and one to every alternate crest along intermediate purlins. Fixings to vertical cladding are to be spaced one to even alternate trough to each rail.

Fittings, unless otherwise specified, are to be lapped a minimum of 150mm and where necessary are to be drilled for and fixed with the fixings securing the roofing and cladding sheets.

Rates for roofing, cladding and fittings are to include for: —

(a) Fixing as described and in accordance with the manufacturer's instructions.
(b) Seam bolting all side laps at not exceeding 450mm centres with 6mm diameter x 25mm long sheet bolts or with 20mm x No. 14 self-tapping screws and each screw or bolt is to be fitted with washers as recommended by the manufacturer of the roofing.
(c) Fixing of fittings where described as fastened to roofing, cladding, etc. with approved pop rivets spaced at not more than 340mm centres.
(d) Sealing side and end laps of sheeting and end laps of fittings with one continuous strip of approved 5mm diameter pre-formed flexible sealant strip.
(e) Coating the exposed heads of fixings and fasteners to baked enamel finished materials and cut edges of sheets and fittings with matching touch-up compound supplied by the manufacturer of the sheeting and in accordance with his instructions.
(f) All square notches, square cutting and waste, laps fitting and drilling. No punched holes will be permitted.
(g) Taking special care at all times to prevent damage to the finished surfaces of the baked enamel finished materials.

All measurements are nett. No allowance has been made for laps.

7. CARPENTRY AND JOINERY

NOMENCLATURE OF TIMBERS: — Timber described as "softwood" is to be South African softwood of the relevant type, grade, etc. as specified.

The names used for imported timbers are those given in Supplement No. 1 to SANS Code of Practice 12 under "Nomenclature of Standard Trade Names of Imported Commercial Timbers used in South Africa" and the Contractor is referred thereto.

TIMBER SIZES: — Sawn and wrot timbers are to be of the full sizes stated.

Where "out of" sizes have been shown for wrot timbers on the drawings, an allowance of 4mm for each wrot face off the sizes shown has been made.

Doors, fanlight, sashes, manufactured boarding, plywood, veneers, etc. must be of the full thickness specified.

Where doors, door frames, fanlights and frames; sashes, windows and frames are measured as numbered items, the overall sizes are given to the nearest 10mm.

Tolerances in nominal dimensions for imported timber shall not exceed the following:

a) For nominal dimensions up to 76mm the actual dimension may be 2.5mm under for each 25mm
b) For nominal dimensions 76mm and over the actual dimension may be 1.6mm under for

each 25mm.

STORAGE OF TIMBERS: — Timber delivered to the site is to be property stacked above ground, either on bearers or platforms under cover and protected from inclement weather.

ORDERS: — for timber, are to be placed immediately after the Contract is signed, as the Contractor will be held responsible for any delay in delivery.

PRE-TREATMENT OF TIMBERS: — All permanent timbers installed in the buildings are to be treated against borer, cryptotermes, termites, and all wood destroying agencies with an approved preventative, all in accordance with SANS Code of Practice 05.

Any surface subsequently exposed by cutting or planing must be touched up with the same preservative solution and rates are to include for all preservative required.

The Contractor is to obtain a certificate from the merchants supplying the treated timber, to the effect that the timber has been treated against wood destroying agencies. The Department has the right to remove samples of the treated timber to have tests carried out by the Division of Entomology or any other Authority.

Temporary timber on the site, e.g. shuttering props, etc. must be free from wood destroying agencies. Any timber so affected is to be immediately removed from the site.

Materials which do not comply with the above requirements or are in any way damaged or discoloured by the pre-treatment must be replaced by the Contractor at his own expense, if so directed by the Department.

STRESS GRADING OF SOFTWOOD TIMBER: —The Mechanical Stress Grading of Softwood Timber (Flexural Method) shall be in accordance with SANS Code of Practice 0149.

STRUCTURAL TIMBER: — for carpentry is to be South African softwood in accordance with SANS Specification 563 and, unless otherwise specified, of Stress Grade V4, and branded accordingly. If it is necessary to use sizes that have to be re-sawn, these shall be re-graded and stamped with the respective SANS stress grade mark. Unless this is done, timber which is re-sawn is no longer considered as complying with the specification and shall on no account be used.

BRANDERING / BATTENS: — of cross-sectional size 50 x 50mm and under shall be South African softwood in accordance with SANS Specification 653 and branded accordingly.

JOINERY AND SHELVING: — Softwood for joinery and shelving shall be South African softwood (S. A. Pine) in accordance with SANS Specification 1359 and branded accordingly. All timber for joinery is to be air or kiln-dried to a moisture content of approximately 12 %.
Shelving to linen stores to be timber slatted with wall bands or free standing units as specified.

STRUCTURAL LAMINATED TIMBERS: — are to be of the sizes detailed, wrot on all faces and are to be manufactured by an experienced fabricator to the approval of the Department. Adhesives used must meet the requirements of the current SANS 1204 for external use.

The surface appearance of members shall be Class C (Constructional) or Class S (Selected) as defined in SANS Specification 876 and as stated in the items

FINGER-JOINTED TIMBERS: — are to be manufactured in accordance with SANS Code of Practice 096— "The manufacture of finger-jointed structural timber".

Contractors wishing to use finger-jointed timber must supply a guarantee that the finger jointing complies with the above Code of Practice and that the glue is suitable for the particular member.

JOINTING OF PURLINS, FASCIAS, RAILS, BEAMS, ETC.: —shall, unless otherwise detailed, be as follows: —

Purlins, slating battens, etc. of cross-sectional size 50 x 76mm and under shall be jointed over the rafter. Larger sized purlins may be dealt with in the same way or by using some other suitable, recognised method. All purlins and battens shall be fixed to the supporting rafter by at least one nail skew driven from the direction of the ridge. Where the purlin or batten is fixed at more than 900mm centres, at least two nails shall be used at every fixing point.

Fascias shall be jointed over rafters.

Beams, rails, etc. shall be jointed over a support or at 1/5th span with a recognised joint using bolts, etc.

Roof and floor plates are to be halved at joints, angles and intersections and nailed together.

Floor joists and bearers are to have splayed heading joints nailed together and staggered to occur over bearers and sleeper piers respectively.

Sawn brandering is to be butt-jointed at heading joints and angles and where wrot, is to have splayed heading joints and mitred angles over all point of support.

HARD WOODS: — (Red Meranti and Sapele) are to be best quality, specially selected and well seasoned, free from all sapwood to the approval of the Department and are to be well kiln-dried.

Red Meranti is to be even in grain and colour, selected from "Standard and Better" grade from Malaysia. Sapele is to be *Entaindrophragma cylindrium* of F..A.S. grade.

PREFABRICATED TIMBER ROOF TRUSSES: -

Design: —The design of prefabricated roof trusses, bracing, and secondary members forming part of the total timber roof construction shall be prepared by a professional structural engineer (Truss Systems Engineer) strictly in accordance with SANS Code of Practice 0160 and the superimposed loading, unless otherwise specified, is to be taken as that for inaccessible roofs.

Analysis: — From the configuration and mechanism shown on the tender drawings the Truss System Engineer shall submit, through the Contractor, to the Department detailed calculations and working drawings showing timber sizes, connections, truss dimensions, etc.

This submission must include details of both trusses and bracing as specified below:

a) TRUSSES: The analysis of the truss system is to include diagrams of the trusses with marked up members and nodes showing dimensions, positions of supports and positions and values of applied loads, which, if not specified in the tender documents, must be derived from an approved source of reference which shall be indicated in the analysis. Due account must be taken of any eccentricity particularly at supports.

   The analysis must also indicate allowable stresses, internal axial forces, moments and resulting stresses, as well as timber sizes and grades and detailed plate sizes

(b) BRACING: Bracing must be designed to withstand the forces specified in SANS Code of

Practice 0163 clauses 6 and 7.

If the bracing system incorporates trusses, the additional forces must be shown in the analysis of the trusses.

The drawings must give all the information necessary for the construction of the bracing.

An outline of the bracing system, including temporary bracing must be shown on a working drawing giving clear details of fixings and anchorages into the supporting structure at wall plate level. Interference of bracing with truss members must be taken into account. Moments caused by forces applied between node points of bracing trusses and the axial forces must be given in the bracing calculations, also sizes and fixings of the bracing system.

Submissions: — A copy of letter reference TR1 (attached at the end of this document) completed and signed by the Truss System Engineer must be submitted by the Contractor at the same time as the list of Sub-Contractors. Two sets of calculations and drawings with pertinent erection instructions for the whole roof construction as presented by the Truss System Engineer must be submitted to the Department for consideration and permission to proceed.

This in no way absolves the Contractor of his responsibilities.

Any modifications to design or drawings are to be arranged directly between the Truss System Engineer and the Department. It will be the Contractor's responsibility to ensure that information is presented to the Department in good time and no claims will be entertained in respect of any delays resulting from the late approval of drawings, etc.

Any difference in cost between the roof system initially submitted by the Contractor and the finally accepted system to meet the original design requirements will be for the account of the Contractor.

The Truss System Engineer will be required to inspect the roof structure and certify on letter reference TR2 (attached at the end of this document) that the construction is in conformity with his design, and any costs in this respect must be included in rates for the truss system.

If, in the opinion of the Department, further visits are necessary due to errors or omissions on the part of the Contractor or the Truss System Engineer the costs of these inspections will be for the account of the Contractor.

Fabrication and Storage: — Fabrication shall not commence until written permission has been given by the Department. The prefabricated roof trusses shall be manufactured, supplied and delivered to site by an approved manufacturer with all members accurately mitre cut, close butted and rigidly fixed together by approved galvanized metal spike connectors applied simultaneously to both sides of every joint by use of a mechanical press in accordance with SANS Code of Practice 0163.

Permissible deviations in fabrication of trusses are to be as specified in SANS Code of Practice 0155.
The following will not be permitted at joints: —

b) knots, splits or finger joints
c) varying member thicknesses
d) plates not fully pressed into timber
e) gaps between members exceeding 1.5mm average over the width of the mitred members.

Stress grade marks must be clearly visible on all members.

Relevant dimensions must be checked on site before fabrication. Trusses must be stored off the ground and under cover both at the factory and on site.

Erection and Bracing: — Unless otherwise instructed, erection must be carried out as described in "The Erection and Bracing of Timber Roof Trusses" published by the Truss Plate Association of South Africa and the National Timber Research Institute - CSIR.

Where the overall lengths of trusses exceed 13 m, complete braced bays are to be assembled on level ground and lifted into position suspended at maximum 3m intervals from a spreader bar. Alternatively, braced bays may be assembled in position on a minimum of two lines of temporary intermediate supports below node joints. Temporary supports must be removed before roof covering is placed.

The erector must be suitably qualified and must satisfy the Department that he can meet the specification.

Where the roof incorporates a hipped end, the construction is to commence with the hip, otherwise erection is to be commenced with a fully braced bay.

Temporary bracing must be installed as erection proceeds in accordance with the accepted design.

The Contractor must notify the Department in sufficient time in order that an inspection may be made before the roof covering is placed.

The trusses will be subject to the following tolerances: —
a) maximum out of straight — length/400
b) maximum out of vertical at any point—height/200.

Rates: — The Contractor is to allow in his rates for the roof trusses for the design, manufacture, supply, hoisting and fixing of the roof trusses and permanent bracing, any necessary temporary bracing, and for the costs of all inspections by the Truss System Engineer.

Purlins or battens for roof coverings have been measured elsewhere. Rates for roof trusses are also to include for the exposed rafters at eaves overhangs to be wrot all round and trimmed and splay cut as required.

INSULATION, WATERPROOFING AND DUST PROOFING MATERIAL FOR ROOFS: — shall be of an approved aluminium foil faced both sides laminated Kraft Paper and synthetic reinforced material fixed in accordance with the manufacturer's instructions, lapped 150mm at all edge, unless otherwise specified.

GYPSUM PLASTERBOARD: — is to be in accordance with SANS Specification 266.

GYPSUM COVED CORNICES: — are to be in accordance with SANS Specification 622.

FIBRE CEMENT SHEETS: — are to be in accordance with SANS Specification 685.

FIBRE CEMENT CELLULOSE SHEETS: — are to be in accordance with SANS Specification 803.

HARDBOARD: — is to be in accordance with SANS Specification 540. Tempered and un-tempered hardboard is to be conditioned in accordance with the manufacturer's instructions before fixing in position.

VENEERS: — All decorative face veneers are to be selected kiln dried of best quality of the respective timbers, free from knots, cracks, patchwork, sapwood and other defects and bonded under heat and hydraulic pressure with water-resistant synthetic resin adhesive.

Commercial veneers are to be selected rotary cut hardwood veneers and otherwise as

described above.

PLYWOOD: — is to be long grain three or five-ply type manufactured with hardwood veneers with selected face veneers as described, bonded under heat and hydraulic pressure with water-resistant synthetic resin adhesive and sanded to a smooth finish.

CHIPBOARD: — All joinery fixtures shall be manufactured from 18mm Moisture resistant V313 Melamine Faced Chipboard (Particle Board) only with 32mm worktop as specified.

BATTEN BOARDING: — is to be long grain three-ply boarding manufactured with kiln-dried South African Meranti softwood core formed of laminations not exceeding 45mm wide and faced on both sides with selected veneers as described, bonded under heat and hydraulic pressure with water-resistant synthetic resin adhesive and sanded to a smooth finish.

DECORATIVE LAMINATE LININGS: — are to be 1.2mm thick approved general purpose quality high pressure decorative melamine laminate sheeting with satin finish and of selected colours and patterns, and rates are to include for all square cutting and waste and square notching, close cut and mitred external angle intersections where required and for bonding to the timber backings with an approved adhesive in accordance with the manufacturer's instructions.

The linings are to be cut out of single sheets in obviate joints but where joints are unavoidable, the sheets are to be butted to form a tight inconspicuous joint.

NAILS AND SCREWS: — Mild steel nails are to be in accordance with SANS Specification 820. Mild steel and brass screws are to be round headed, countersunk, etc. as appropriate and are to be in accordance with SANS Specification 1171. Nails and screws shall be of the size, length and type appropriate to their respective uses.

PLUGS, ETC.: — Where items of woodwork are described as "plugged", these may be nailed to timber plugs or slips built into the structure, and where described as "plugged and screwed" these may be screwed to timber or approved patent fixing plugs.

SHOT FIXING: — Where items of woodwork are described as "shot fixed" these are to be fixed with an approved cartridge-assisted tool, and rates are to include for all nails, spikes, blanks, washers, cartridges, accessories, etc.

CARPENTRY: — Timbers are to be the best of their respective kinds, free from sap, shakes, large, loose or dead knots, wavy edges and other defects and thoroughly seasoned. Wrot surfaces are to be finished clean, smooth and free from tool marks.

Timbers shall be in as long lengths as possible.

Rates for sawn and wrot structural timbers are to include for notching, splay and birds mouth cutting, housing, halving, scarfing, cutting timbers to the required lengths, spiking and clinching and or hoisting and fixing timber in position.

CEILINGS: — are to be of the types described, fixed to timber brandering, bearers etc. as described and with panels set out so as to give even width panels not less than half a sheet wide at edges. Brandering shall be spaced at not more than 400mm c/c and fixed at right angles to sheets.

FLUSH PLASTERED CEILINGS: — are to be formed of gypsum plaster board of the thickness stated, generally in 1200mm widths and long lengths, fixed grey side down to timber brandering, bearers, etc. as described, with butted joints between the boards covered with 65mm wide strips of galvanized wire scrim fixed along both edges, including all square notches and square cutting and waste, and the ceiling finished with two coats of approved retarded hemi hydrate gypsum plaster applied in accordance with the manufacturer's instructions to a finished thickness of not less than 6mm, including pressing into scrim over joints and finished to a smooth polished surface.

TRAP DOORS:- 900 x 600 Prefabricated hinged trap door.

SUSPENDED CEILINGS BOARDS: — are to be of the types described or as specified – normally 6mm x 600mm x 1200mm embossed fibre cement boards - and inclusive of their component parts must be of sufficient strength to perform the function for which they are to be used, manufactured from best quality materials and conform to the requirements of the Fire Master. The exposed surfaces of all ceiling panels and supporting members are to be uniform in colour and free from surface blemishes.

Hangers are to be galvanized and are to be at maximum 1, 2mtr centres to meet the requirements of the specification, each with one end fixed to the suspension grid main bearers and the other end fitted with suitable galvanized fixing straps to the roof structure. Fixing points must be agreed to by the Department before any power shot fixings are made. Hangers must not be suspended from air-conditioning ducts.
Hangers to be provided at all four corners of recessed light fittings.

Component parts and fixings other than aluminium must be non-corrosive and able to withstand atmospheric pollution. Surfaces of aluminium which are in contact with other materials when fixed, particularly ferrous metals, are to be suitably insulated to prevent electrolytic corrosion.

All work is to be executed by specialists in accordance with the manufacturer's instructions, and to the approval of the Department.

Rates for ceilings are to include for hangers, suspension systems, ceiling panels, for constructing the ceilings in a manner suitable for carrying air conditioning diffusers and light fittings in the positions required, for setting out the ceilings to layouts approved by the Department, for all non-standard size panels, for modifications to standard suspension systems as necessary to work around any air-conditioning ducts or pipes or light fittings, for all necessary square cutting and waste, notching and fitting around projections, columns, etc.

EXPOSED TEE-SYSTEM SUSPENDED CEILINGS: — are to be of the type described with main tees and cross tees spaced at the required centres to suit the sizes of panels used, with the cross tees fitted between and notched to form a flush fit with main tees unless otherwise described. All suspended ceilings to be fitted with shadow line trimming to perimeters.

Main and cross tees shall be holed as necessary and provided with timber wedges or steel clips to prevent ceiling panels from lifting.

CONCEALED TEE-SYSTEM SUSPENDED CEILINGS: — are to be of the type described with main and cross tee section bearers spaced at the required centres and all properly fitted together at intersections.

ALUMINIUM TRIMS TO CEILINGS: — are to be of extruded aluminium of 6063-TF or equivalent quality and temper, of the sections described. Anodised trims are to be of the colour stated.

Rates are to include for all cutting, fitting at intersections, mitres, etc. and rates for items described as fixed with screws are to include for countersunk drilling and fixing with approved countersunk stainless steel screws.

INSULATION MATERIAL FOR CEILINGS: — shall be 75mm thick resin bonded glass wool / mineral wool thermal insulation blanket complying with SANS Specification 1381 of the thickness specified, delivered to the site in unopened rolls in its original factory wrappings over solid gypsum boards or styrene of 25mm thickness as specified glued to suspended ceiling tiles.

DOORS: —

Flush Doors: - Semi-solid and solid laminated flush doors are to be of approved manufacture complying with SANS Specification 545.

The doors are to be finished on both sides with the facing veneers specified and concealed on both stiles unless otherwise specified, with hardwood edge strips and where doors are required to receive a transparent finish, the edge strips are to match the facing veneers.

Doors with rebated meeting stiles are to have edge strips to the meeting stiles not less than 19mm thick.

Each door or leaf of double door, described as hung to swing, is to be fitted with necessary hardwood reinforcing blocks for bottom shoe and top centre of spring hinge.

Unless otherwise specified, all flush doors are to be interior quality, but, where exterior doors are specified, the glue used must comply with Type WBP of SANS 2304.

FRAMED, LEDGED AND BRACED BATTEN DOORS, ETC.: — Doors described as filled in with V-jointed boarding are to be filled in flush on one side with tongued and grooved vertical boarding, V-jointed on one or both sides and of the thickness stated. The boarding is to be in narrow widths, closely cramped up, rebated on outer edge and housed to grooves in stiles and rails and twice brass countersunk screwed at each intersection.

Ledges and braces and inner edges of the abutting stiles and rails are to be chamfered to form a V-joint at junction with the boarding. Braces to fall from lock to hinge side.

ENTRANCES TO SECLUSION WARDS: - Entrances to seclusion ward buildings shall be fitted with remote controlled full height 'Man Trap' Security Cubicles with bell pushes fitted to both entry and exit sides and remote unlocking / release operation enabled from security booth.

Doors to Seclusion Rooms: - Doors to seclusion rooms are to be steel lined solid core units with 100mm x 100mm viewing panel, glazed with 40mm bullet proof glass in a steel frame. Steel lining for doors is to be epoxy laminated to doors and around edges. Internal steel lining to be primed and finished with approved epoxy paint. External face of doors to be finished in veneer as per DOH standard details. Doors to be hung to open inward on special 6mm galvanized steel door frames with lugs pre welded to frame to fit every third course of brickwork. The complete unit is to be hot dip galvanized and built into surrounding 230mm solid brick walls. No welding to be done on site.

NOTE: - Above Anti–Bandit Security doors are solely supplied by "Chubb" and "Bitcon Industries" as a complete unit with all fittings and ironmongery.

DOORS TO X-RAY UNITS

Entrance doors to X-Ray rooms shall be top hung sliding door size 1830 x 2032 x 40mm, complete with heavy duty sliding door track – 'Henderson' or other approved -, 2.2mm lead insert between panels and four door stoppers. Door is to overlap door opening 100mm each side when closed.

JOINERY: — All timbers shall be in as long lengths as possible. Lengths for joinery shall be single where possible and where joints are unavoidable, they shall be made as inconspicuous as possible.

Timber for grounds, firrings, blocks, plugs, etc. shall be sound and free from defects.

All joinery work is to include for work in connecting by mortise and tenon, dovetailing, housing, flush pinning, etc. as may be by required and for all screws, nails and glueing

together and for sinking flush all exposed screws unless otherwise specified.

Wrot surfaces and edges are to be steel scraped and sandpapered before and if necessary, after fixing.

Edges are to be arras rounded unless specified to be angle rounded.

"Arras rounded" denotes that the sharp edges are slightly rounded off and that no mitring is required.

"Angle rounded" denotes rounded from 3mm to 10mm radius and is to include for housed and mitred joints.

Hardwood doors, frames, jamb and soffit linings, etc. are to be treated on all surfaces with one coat of approved sealer before building in, etc. and rates for these items must include for this. Batten doors with tongued and grooved battens are to have the tongues and grooves well sealed before assembling. The sealer used shall be compatible with the finishing coats to be applied.

Horns of door frames are to be checked and splayed back where frames are fixed projecting or flush with surface and built in.

Where doors, fanlights or sashes are described as hung to butts on steel or aluminium frames, rates are to include for supplying necessary steel, brass or stainless steel screws.

Panel work is to be secured to the grounds, etc. with screws concealed behind the mouldings or by sinking the screws and pelleting as directed.

Joinery is to be framed up, but not glued or wedged, immediately the order is given to commence work. Wherever possible, joinery shall not be placed or fabricated in position until the plaster has dried out. Reasonable tolerance shall be provided at all connections between the joinery and building carcass so that any irregularities, settlements or other movements shall be adequately compensated. All joinery shall be accurately scribed to fit the contour of any irregular surface. Should the joints of any joinery open or give, such defective work is to be taken down, refitted and redecorated or replaced by new joinery at the Contractor's expense.

Only brass screws may be used for hardwood joinery.

The Contractor is to allow for cross-tonguing all solid wood sections unobtainable in single widths.

No joinery is to be primed until it has been inspected and approved by the Department.

All joinery liable to injury must be protected to the satisfaction of the Department. Rates must include for this temporary protection.

Rates for timber frames, mullions, transoms, linings, standards, rails, fascias, cornices, skirtings, beads, picture rails, etc. are to include for mitres, etc.

Rates for all items of timber-are to include for fixing and planting on as may be required with necessary panel pins or nails.

PARTITIONS:

These are to be of an approved system of standard construction, with an average sound rating of not less than 30 decibels taken over the whole face area.

Framing is to be natural finish anodised aluminium comprising posts at 1200mm centres unless otherwise described, with transom rails where specified, fitted between the posts, a

rail against ceiling and an aluminium standard skirting on each side at base, all neatly and securely fixed together.

Provision is to be made at the base of the partitions and in the ceiling rails and posts for electrical wiring, which will be installed under the electrical sub-contract, and the ceiling tails and end posts are to be fitted with continuous removable access plates.

Solid panelling is to be approved solid chip core panels of the thickness specified faced on both sides as described in the items.

Glazed panels are to be glazed as required, complete with all necessary natural finish anodised aluminium glazing beads and vinyl glazing strips.

Louver panels where specified are to be approved natural finish anodised aluminium adjustable louver sets each comprising head and sill weather bars and two jamb strips each fitted with louver brackets with spring loaded clips for and fitted with and including louvers as required and complete with tilt bars and operating lever handles. Where the openings are not the correct size to suit a full number of standard width louver blades, an alternate head weather bar must be provided to suit a fixed louver blade of the required width. The louver sets are to be fitted with the jamb strips positioned horizontally so that the louvers will be fixed vertically.

Partitions are to be in 1200mm modules, unless otherwise specified, except at ends where the odd lengths are to be made up by a narrow width at one end of the partition.

Ends of partitions against walls, window frames, etc. and the top edge of partitions against ceilings are to be fitted on both sides of partition with approved vinyl scribing sections fitted between the structure and the end post or top rail of the partition.

Plain openings are to have aluminium frames similar to door openings neatly fitted into the framing.
Doors are to be solid laminated flush doors complying with SANS Specification 545. The doors are to be finished on both sides with veneer as described in the items and concealed on both stiles with matching hardwood edge strips.

Where doors are described as having observation openings, these openings are to be of the sizes stated, glazed as specified with all edges bedded in approved neoprene gaskets and fixed with 10 x 25mm wrot matching hardwood rebated glazing beads mitred round and bradded to both sides.

Rates for doors are to include for all necessary additional aluminium framing to form door openings, and for hanging the doors on and including one and a half pairs of 102mm satin chrome finish brass hinges to each door.

All locks to doors in demountable partitions are to be supplied with two keys, and are to be controlled by the same master key as the mortise locks used elsewhere in the Contract when specified.

Unless otherwise specified all veneered solid panelling and doors are to be finished as follows: —

Prepare, stop with tinted stopping, apply an approved stain as necessary to achieve uniform colour appearance, and three coats of approved clear matt polyurethane finish including burnishing with steel wool between coats.

Rates for demountable partitions are to include for supplying, assembling, erecting, finishing, glazing and fixing complete between finished surfaces of concrete floors, plastered walls and ceilings, and all in accordance with the manufacturer's instructions.

DEMOUNTABLE PARTITIONS 50MM (NATURAL ANODISED).

Extruded Aluminium Sections

Supply and fit demountable "Kappa" partition system comprising anodized aluminium U-Channel fitted to suspended ceilings. Vertical split-post (mullion) to be fitted between floor and ceiling U-Channel at 1225mm c/c with angle brackets. Once framing is fixed, fit panels into place and secure with clip-on cover plates.
All aluminium sections may be anodized or powder coated in a variety of colours.

Panels

41mm thick semi solid core panels 2032 x 1200mm. The panels are made up of two outer skins of 3.2mm hardboard cladding. Lower panels to be provided with a 150mm wide solid mid-rail 850mm from the base of the panel to the centre of the mid- rail built in as part of the construction. The panels to be prepared before applying the final finish as specified.

Construction

Right angled corners to be formed with natural anodized aluminium radiused corner post fitted from floor to ceiling. Floor fixing to be angle brackets and ceiling fixing to be hidden block. The ceiling U-Channel butts up against radiused corner post.

Door Frames

Door frames to be natural anodized aluminium pre-fitted with woolpile gaskets, clipped into H-Profile at head and clipped into combination split post and cover plate at styles. The rebate on the door frame caters for standard doors of a thickness between 40mm and 44mm.

Glazing

Glazed panes to be framed with H-Profile fitted horizontally at top and bottom, butted against side of split-post and clip on cover plate combination and fixed with angle brackets. Glazing sections pre-fitted with woolpile gaskets and set into H-profiles and into post / cover plate combinations to form a neat glazing opening. Glazing beads pre-fitted with woolpile gaskets and then clipped into glazing section.

Termination

Openings for louver frames, sliding doors and windows, serving hatches and partition ends are to be lined with the aluminium termination section.

Skirtings

76mm high aluminium skirting to be glued to panels.

DRYWALL PARTITIONS:

Studs

50mm x 33.5mm x 0.5mm thick drywall galvanised steel studs are used. The studs to receive aluminium extrusions clipped onto both sides of the stud. Framing to be securely fixed to walls, floor and ceilings where necessary. Stud connectors to be used to join horizontal studs to vertical studs.

Floor Track

52mm x 25mm x0.6mm galvanised sheet steel track to be used.

Panels

12,7mm thick tapered edged gypsum plasterboard panels used and decorated in situ with panels secured to either side of framework.
Patient care areas to be 12mm Supa Wood panels in framework as specified.

Construction

Internal walls are constructed by fixing drywall studs to floor track @ 600mm c/c. Wall and ceiling junctions are formed by fixing 84mm x 19mm aluminium ceiling and wall channel to wall or ceiling. The floor track is then fixed into this; alternatively, these components may be fixed simultaneously. The studs are then fixed to floor.
The partitions, unless otherwise described are to be 75mm thick and covered both sides with 12,7mm thick tapered edged gypsum board in 1200mm widths to height specified.
The gypsum boards are screwed @ +/- 300mm c/c at all intersections to the floor and head wall tracks and vertical studs.
Using self-drilling, self-tapping, rust proofed countersunk screws, with screw heads and joints between boards and between abutting edges of boards flushed up with an approved jointing material.

Exposed Aluminium Framing
Door frames, glazing termination and ceiling and wall channels to be natural anodised aluminium. 25 x 25 x 1.5 aluminium angle stuck to external corners of partitioning. 80mm high aluminium skirting glued in position.

Glazing
Aluminium glazing section is clipped onto the flanged end of the stud around the glazing perimeter. The glazing section has a recess to accept a rectangular clip-in glazing bead which enables 3mm-8mm thick glass to be received in the system. The glass is retained with various sizes of PVC glazing gasket.

Termination
Openings for louver frames, sliding doors and windows, serving hatches and partition ends are to be lined with the aluminium termination section.

Skirting
The system is designed to accept recessed base, female, 60mm high aluminium skirting.

Sound Insulation
75mm Fibreglass Cavity Bat with a 35g glass tissue or 75mm Isotherm "Acoustisorb' mineral wool blanket is to be installed between studding before fixing final outer panel.

All work is to be executed by a firm specialising in this type of work and all to the approval of the Department.

8. FLOOR COVERINGS, PLASTIC LININGS, ETC.

FLOOR SHEETING: — are to be of the composition, type, size and thickness specified with colour, pattern, graining, etc, consistent throughout, all to the approval of the Department.

Thermoplastic floor tiles: — are not to be used.

Fully flexible vinyl floor sheeting: — are to comply with SANS Specification 786 and is to be 2.5 mm nominal thickness.

Recessed entrance mats with brass frame at main entrance into a health facility as "Belgotex" Grimbuster or other approved. This to be positioned outside before entering.
In patient care area's, no perforations to floor covering is to be made. Eg door stops, door barrel bolt floor keeps etc.
Where the specified sizes and/or thicknesses of floor sheeting differ from those in the SANS Specifications, such items of floor sheeting shall comply in all other respects with the relevant SANS Specifications.

SKIRTINGS, STAIR NOSINGS, EDGING STRIPS, ETC.: —are to be of the types and sizes specified and are to be of approved manufacture

CARPET TILES AND SHEETING: — are to be of the types specified and of approved colours and patterns all to approval of the Department.

LAYING: —
Vinyl Floor covering laying procedure and polishing.

Site conditions required before the layer commences an installing of a Resilient Floor covering. Some of these conditions may appear obvious, but they are not always complied with. If any of the following recommendations are ignored, it is likely that a number of problems will arise during or after installation of the flooring.

1. All building materials and equipment, e.g. sand, scaffolding, tools, etc. should be removed. (Do not allow heaps of sand, concrete, etc., to remain on the surface of the sub-floor since moisture transfer to the sub-floor takes place).

2. All resilient flooring materials require a smooth, hard, clean and level surface, not only for appearance but also for achieving a satisfactory adhesive bond and long-term durability. The Specifier and the Main Contractor shall ensure that the sub-floor is acceptable to receive the resilient flooring specified in respect of levelness, smoothness, soundness and cleanness. (The SANS Code of Practice 070/1991 as amended 1993 Section 9.3 details the requirements in this regard).
The flooring contractor shall ensure that the sub-floor is sufficiently dry prior to the installation of the flooring material. The floor should be tested by means of a Hygrometer or a Tramex. (Of the instruments available for determining moisture levels in sub-floors, the most practical and accurate is the hygrometer).

SHEETING
Ensure that the following steps are followed during the installation:

1. Trim off factory leading edge before laying sheeting.
2. Align the sheet in position that there is an opening no bigger than 1mm between adjacent sheets. For the best results, the width of a credit card is an acceptable measure.
3. Apply adhesive according to the manufacturers' specifications.
4. Roll the floor during and after installation with a 68kg roller to maximize the adhesion between the sheeting and the adhesive.
5. Complete the welding 24 hours after the installation. Groove the joins open with a suitable hand or electric groover to a width of not wider than 3mm and not deeper than 1.5mm. Weld the joins with a hot air welding gun with temperature settings of between 4-6 temperature setting and use a speed nozzle that will not burn the material or damage the coating. Use a sharp spatula and guide plate and remove the excess welding in two stages.
6. All vinyl sheeting needs to be stripped and sealed 72 hours after installation. Please ensure you use a good quality product.

2.1 **HYGROMETER**
When a hygrometer is positioned on a sub-floor surface, the reading of the relative humidity of the entrapped air space is obtained.

- A hygrometer reading of less than 70% indicates that the sub-floor is sufficiently dry for flooring to be laid upon it.
- If the hygrometer indicates a final reading of more than 70% when the initial reading of the atmosphere was less than 70% then the sub-floor is unacceptably damp and must be allowed to dry out before any flooring is installed.
- If the hygrometer indicates a final reading of more than 70% when the initial reading of the atmospheric humidity was also greater than 70%, as can occur in coastal areas, then the following applied:

1. If the final reading is significantly higher than the initial reading, then the sub-floor must be considered to be unacceptably damp.
2. If the final reading is similar to, or less than the initial reading, then the moisture content of both the atmosphere and the sub-floor are similar.

2.2 **TRAMEX CONCRETE MOISTURE ENCOUNTER (C.M.E.)**
Any reading on the C.M.E. of 60% or less indicates acceptable moisture content for the installation of any vinyl floor covering.

3. Floor Preparation – New and Existing (old) Screeds
3.1 Use of screed smoothing compounds should be avoided except for making minor repairs, however should a full skim be required, then the most common method in both instances is the use of a smoothing compound e.g. **Pavelite** in combination with **Pavelite Bonding Liquid**, mixed to the correct ratio and consistency. Only recommended products, mixed strictly in accordance with manufacturers instruction should be used. Do not use smoothing compound on power floated finishes. It is recommended that in new structures the screeding should be as specified by "Tal" using "Screedmaster", the pumped method.
A badly undulating floor may require grinding by mechanical means to improve the overall levelness. Although smoothing compounds such as **Pavelite** will improve the sub-floor it will not achieve perfection.
3.2 In cases where old vinyl floor coverings have been uplifted, leaving a bitumen adhesive residue, it is recommended that a strict procedure relating to the "Preparation of Sub Floors with Bitumen Residue", be complied with.
(This method may not constitute good flooring practice, but has proved to be successful on many occasions. No guarantee is however given or implied).

4. **Construction joints (saw cuts) and Expansion Joints**
4.1Construction joints (saw cuts) in the sub-floor should be cleaned out, and the sides of the saw cut be painted with **Pavelite Bonding Liquid** and allowed to dry. The joint should then be filled with a mixture of **Pavelite** and **Pavelite Bonding Liquid**. It is advisable to slightly overfill the joints, which when dry should be rubbed down with a carborundum stone.
4.2 Expansion joints should be filled with a suitable **Sealant** to prevent the ingress of dirt. **It is bad flooring practice to lay flooring over such a joint**. The flooring should stop at the edge of the joint and cover strips placed over the joint itself. Expansion joints and cover strips should be discussed and designed by a structural engineer.

5 Correct setting out is critical, and consideration should be given to the squareness of the area. It is safest to set out from the longest outside wall.
5.1. The recommended notching for a trowel to spread adhesive is a V notch of 1,5 x 1,5 x 1,5mm at 4,00mm centres. Consideration should however be given to the porosity of the sub-floor. Ensure the use of the recommended adhesive with the appropriate flooring. **Do not** spread the adhesive over a larger area than can be covered within the working/open time of the adhesive.
5.2 All installations must be rolled with a 68kg three sectional articulated metal floor roller on completion, within the working time of the adhesive.
5.3 Welding of sheeting is to be done only after 24 hrs after installation.
5.3. a. Trimming
While the welding rod is still warm, trim off most of the top half using a sharp spatula and spatula guide which fits over the welding rod. Carry out the final trimming using the spatula knife only, when the welding rod has cooled.
5.3.b **Glazing**
The trimmed welding rod will tend to soil more rapidly than the sheeting. It is therefore Important to glaze the surface of the trimmed welding rod.

6. After installation the flooring should be adequately protected, preventing damage caused by other trades working on the site.

7. The completed floor should not be washed or polished for a period of 72 hours after the installation in order to allow the adhesive to cure. This period will vary from one adhesive to another.
7.1 The vinyl floor covering must be cleaned with an approved water based floor Stripper, in order to achieve an acceptable standard of cleanliness for sealing. Avoid excessive use of water at all times

7.2 Foreign matter such as paint stains, tar, etc. which may not respond to the process must be removed by other means.
7.3 Three coats of a Water Based Emulsion floor dressing, shall then be applied on completely dry surface in accordance with the manufacturer's instructions, allowing one hour drying time between the first and second application of each dressing coat.

RATES: —for all floor coverings are to include for laying as described, for cleaning down backing surfaces before laying and or all square and raking cutting and waste and fitting, fair cutting at edges where no skirting occurs, protecting from injury, and for cleaning down, etc. as described, at completion.

Rates for all wall linings are to include for laying as described, cleaning down backing surfaces before laying, sizing backing surfaces if necessary to ensure proper adhesion, all square and raking cutting and waste and fitting, fair cutting at exposed edges, bending at angles and for all narrow widths and protecting from injury and cleaning down, etc. as described, at completion. Wall linings in widths not exceeding 300mm to returns, reveals and the like have not been measured separately, but have been included in the area of the general items of wall linings and rates must include or this.

Rates for skirting, stair nosing, edging strips, etc. is to include for fixing as described, cutting to lengths and fitting at intersections, mitres, ends, etc. and for cleaning down at completion.

9. IRONMONGERY

Ironmongery is to be to the approval of the Department and rates are to include for fixing screws of corresponding metal and finish and for oiling and easing as required at completion.

Where catalogue references are given, the articles are to be of the brand specified or other approved.

No two-lever mortise locks are to be used.

Mortise locks, cylinder locks, cupboard locks, etc. are to differ so that no key will pass a second lock, unless otherwise specified. Where mortise locks, cylinders, locks, etc. are specified to be "en-suite" they are to be made "en-suite" in the specified number of "suites". The "suites" are to be controlled by differing sub-master keys with a grand master key controlling all "suites", and no sub-master is to pass any lock of another "suite".

All locks are to be fitted with two keys and the locks are to be stamped with consecutive numbers and the keys to each are to be stamped to correspond with the lock.

Items of ironmongery specified as chrome plated or satin chrome finish are, unless otherwise specified, to be chromium plated or satin chrome finish on solid brass.

Items of ironmongery specified aluminium are to be natural anodised.

Where items of ironmongery are specified as fixed to pressed steel door frames, the Contractor is to ensure that the suppliers of the steel frames prepare the frames for all keeps and do all mortising and drilling required and receive all information necessary regarding ironmongery. Preparation of steel doorframes for ironmongery has been measured elsewhere.

Where tests of ironmongery are described as "plugged and screwed" these are to be screwed to patent fixing plugs of approved manufacture, and this shall include for plugging and screwing to brickwork or concrete.

Key tags are to be 40mm diameter x 3mm thick plaster of approved colour, engraved on face with the required number of letters and numerals finished in an approved colour, and the tag is to be holed for and fitted with a steel split ring and fixed to key.

Engraved plastic door signs and numeral plates are to be of 5mm thick clear plastic with square polished edges all round with an approved coloured background and sans-serif letters and numerals as described in the items, reverse engraved in the plate with splayed sides and flat reading face and finished in an approved contrasting colour. Each sign is to be twice drilled for and fixed to softwood or hardwood, unless otherwise described, with chromium plated round beaded brass screws. Unless otherwise described, the signs are to be 50mm high with 30mm high, engraved letters or numerals and are to allow a minimum margin of 25mm at both ends. All signs are to be equal to sample to be submitted to and approved by the Department.

Pictorial plastic signs are to be of 5mm thick clear plastic of the sizes stated in the items with square polished edges all round and with the silhouette described in the items applied to the back of the plate by means of the silk screen process in an approved colour and the whole back of the plate finished in an approved contrasting colour. Each sign is to be four times drilled and fixed to softwood or hardwood, unless otherwise described, with chromium plated round-headed brass screws. All signs are to be equal to sample to be submitted to and approved by the Department.

10. STRUCTURAL STEEL WORK

GENERALLY: — The fabrication, assembly and erection of structural steelwork is to be executed in accordance with SANS Specification 1200H — Structural Steelwork (a copy of which the Contractor will be required to keep on site so that it can be referred to at all times during the Contract) with the following amplifications and amendments: —

INTERPRETATIONS: — Clauses 2.1 and 2.2 refer. This preamble, together with any other supplementary preambles appearing in these Bills of Quantities shall be deemed the project specification and are the "Portion 2" referred to in Clause 2.2.

DEFINITIONS: — Clause 2.3 of SANS Specification 1200H refers. All references to the Engineer shall be deemed to mean the Department.

SUB-CONTRACTORS: —The Contractor shall either (a) have adequate satisfactory and approved experience in this type of work or (b) employ an approved specialist structural steelwork Sub-Contractor. The Contractor, in the case of (a), or the specialist Sub-Contractor, in the case of (b), shall employ at all stages of the Works both on and off site a competent Supervisor experienced in the work.

MATERIALS: — Unless otherwise shown on the drawings or hereunder, all rolled sections shall be hot rolled mild steel, and all materials shall comply with one of the following: —

a) Weldable Structural Steels to SANS 4360:
b) Hollow sections to SANS 4848 Part 2 and SANS 6323.
c) Cold rolled sections to SANS 2994.
d) Black bolts and nuts to SANS 135.
e) Precision bolts and nuts to SANS 136.
f) High-strength friction-grip bolts and nuts to SANS 1282.
g) Flat and tapered washers to SANS 1149.
h) Electrodes for welding to SANS 455.

SHOP DETAIL DRAWINGS: — The Contractor shall prepare shop detail drawings, in conformity with the details shown on the structural steelwork drawings and to show all information necessary for complete fabrication, assembly, ejection and painting. In the preparation of the shop detail drawings the Contractor is to comply with the requirements of SANS Code of Practice 0162.

The cost of preparing all necessary shop detail drawings and copies thereof is to be allowed for by the Contractor in his rates.

The Contractor shall submit two copies of his shop detail drawings to the Department for approval at least 10 days before fabrication of the member concerned is due to commence. Such approval does not imply that a complete and comprehensive check of the detail drawings has been carried out, and the Contractor shall remain responsible for ensuring that the steelwork is correctly fabricated, assembled, erected and painted.

SUBSTITUTION OF SIZES, ETC.: — No substitution of sizes or joints additional to those shown on the drawings shall be made without the prior approval of the Department. Except in cases of proven non-availability of materials specified, any additional costs involved due to substitution shall be for the Contractor's account.

FIXINGS: — The positions and manner of fixing the hangers for suspended ceiling air-conditioning ducts, pipe installations, etc. to the structural steelwork are to be approved by the Department before work on such installations commences.

FABRICATION, ASSEMBLY AND ERECTION

Welding: — shall be carried out in accordance with SANS Code of Practice 044 and the relevant recommendations of SANS Code of Practice 0162 and SANS 5135, and in any case of conflict, the SANS Codes of Practice shall be deemed as binding.

All welders employed on the Works shall be currently classified at least as grade 2 welders as defined by SANS Code of Practice 044. Should the Department so request, proof of the classification shall be produced.

Unless otherwise specified all welds are to be continuous fillet welds of 6mm leg length or not less than the thinnest plate or section being welded.

Handling, Storage and Erection: — of members is to be undertaken in such a manner to prevent overstress or damage. Should overstress or damage occur, the Department shall be informed and his instructions sought.

Storage shall be arranged such that damage to applied finishes is prevented.

All plant and equipment used in the erection of structural steelwork shall be adequate in every respect. The Contractor shall allow in his rates for all necessary temporary bracing, and for maintaining and finally removing such temporary bracing.

Fixing of Bolts, etc.: — Unless approved by the Department, no pre-drilled fixings for bolts, etc. will be permitted through hollow section members. Any hollow section member that has been drilled or punctured in any way shall be considered condemned and must be replaced to the satisfaction of the Department.

INSPECTION AND TESTING

Facility for Inspection: — The Contractor shall afford to the Department all reasonable access to inspect the steelwork at any stage of its fabrication, and shall give due notice before delivery of steelwork to the site to allow inspection and tests to be conducted if so required by the Department.

Cost of Tests: — The cost of all tests required by the Department shall be borne by the Administration, except that the costs of the following tests shall be borne by the Contractor:-
(a) Testing of welders and equipment
(b) Such tests (including load tests) as may be necessary by failure on the part of the Contractor to meet the requirements of the specification.

Procedure in the Event of Failure: — In the event of a failure of a test, the Contractor shall

either replace the defective item or prove its sufficiency by means of a load test carried out in accordance with Appendix B of Chapter 6 of the South African Standard Building Regulations. If so required by the Department the Contractor shall also demonstrate by means of tests at his own cost that all like members meet the requirements of the Specification.

PRIMING OF STRUCTURAL STEELWORK

General

(a) Painting conditions.
No painting shall be undertaken when one or more of the following conditions exist: —
(i) The atmospheric or steel temperature is below 10^0 C,
(ii) The atmospheric or steel temperature is expected to fall below 7^0 C before the paint is dry,
(iii)The atmospheric or steel temperature is high enough to cause damage to the paint film,
(iv) In fog or mist,
(v)The relative humidity is greater than 90 %,
(vi) Surfaces are or will be wet or damp from rain or other causes,
(vii) Surfaces are contaminated by dirt, dust, grease, oil or other matter detrimental to painting,
(viii) Wind will deposit dust onto un-dried surfaces.

(b) Extent of shop painting.
All surfaces shall be primed as described in the shop except: —
(i) Those to be encased in concrete which are to be left as prepared metal; unless otherwise specified
(ii) Contact surfaces of high strength friction-grip bolt connections which are to be left as prepared metal
(iii) Edges or faces yet to be welded which are to be left as prepared metal over sufficient width from the weld to avoid contamination of the weld or damage to the paint by the effect of welding.

(c) Paint identification, storage and preparation.
All paint shall be supplied in unopened original containers showing the manufacturer's name and trademark date of manufacture and the relevant SANS or other specification number.

No paint shall be used past its maximum life span but otherwise oldest paint shall be used first. Containers shall not be opened until required and opened containers shall be used before unopened containers

Before use, paint shall be thoroughly stirred and prepared in accordance with manufacturer's instructions.

(d) Thinning.
No paint shall be thinned except strictly in accordance with manufacturer's instructions.

(e) Dry film thickness.
Where not specifically later stated this shall be in accordance with manufacturer's instructions for spreading rates. A tolerance of approximately 10% of that thickness will be allowed.

(f) Touching-up surfaces.
Surfaces shall be protected against damage, but should this occur, then the paint shall be rubbed down over the damaged and surrounding area to a sound surface and then restored by re-applying the removed coat properly feathered in with the existing.

Upon completion of site connections, these connections shall be stripe painted with the specified primer before any further painting is carried out.

Class P1 Preparation and Priming Coat: — Unless otherwise specified, rates for structural steel-work are to include for Class P1 Preparation and Priming Coat as follows:-

(i) Surfaces are to be cleaned in accordance with SANS Code of Practice 064 to remove all rust, scale, grease, oil, etc. endeavouring to bring the surface to a bright metallic condition, and painted, unless otherwise specified, with one coat of red -oxide zinc chromate primer in accordance with SANS Specification 909 prior to despatch from the works.

(ii) Upon delivery to the site and again after erection any bared or damaged surfaces are to be made good with similar primer.

The Contractor is advised that the finishing coats of paint to be executed after the erection of the structural steelwork have been measured elsewhere.

Class P2 Preparation and Priming Coat: — Where specified, rates for structural steelwork are to include for Class P2 Preparation and Priming Coat as follows: —

(i) Surfaces shall be thoroughly cleaned by sandblasting to Swedish Standard SIS 055900 standard Sa 2½ to give minimum peak to valley profile of 50 micrometer when measured by SANS Draft Test Method No. 772.

(ii) Surfaces shall be blown thoroughly clean with compressed air and within four hours of sandblasting, one coat of "Plascon SN 162 Ironguard-4-Zinc" or other approved primer of minimum dry film thickness of 75 micrometer shall be applied by pressure pot spray system in accordance with the manufacturer's instructions in the shop.

(iii) Upon delivery to the site and again after erection, any bared or damaged surfaces are to be made good with similar primer.

The Contractor is advised that the finishing coats comprising one intermediate coat and one finishing coat of chlorinated rubber paint to be executed after the erection of the structural steelwork have been measured elsewhere.

Class P3 Preparation and Priming Coat: — Where specified, rates for structural steelwork are to include for Class P3 Preparation and Priming Coat as follows: —

(i) Surfaces shall be thoroughly cleaned by sandblasting to Swedish Standard SIS 055900 standard Sa 2½ to give maximum peak to valley profile of 50 micrometer when measured by SANS Draft Test Method No. 772.

(ii) Surfaces shall be blown thoroughly clean with compressed air and within four hours of sandblasting, one priming coat of "Epidermix 352" or other approved epoxy coal tar of minimum dry film thickness of 75 micrometer shall be applied in the shop.

(iii) Upon delivery to the site and again after erection, any bared or damaged surfaces are to be made good with similar primer.

The Contractor is advised that the finishing coat comprising a further coat of epoxy coal tar to be executed after the erection of the structural steelwork has been measured elsewhere.

MEASUREMENT AND PAYMENT: — The provisions and Clause 8 will **NOT** apply and the system of measurement which is adopted in these Bills of Quantities is the only system of measurement which will be recognised in this Contract.

RATES FOR STRUCTURAL STEELWORK: — Rates for structural steelwork are to include for all necessary cutting to lengths, splay cut ends, shaping, holing, tapping, threading, forging, turning, assembling, welding, and fixing in position.

11. METALWORK

PROPRIETARY MATERIALS: — Where proprietary materials are specified, the materials used are to be of the type, specified or other approved by the Department.

RATES: — for all metalwork, unless otherwise stated, are to include for cutting to length, shaping, turning, threading, forging, fitting, assembling, riveting, welding, welded running joints, filing smooth, also for all screws and holes and hoisting and fixing in position. All screwed work is to have full threads.

WELDING AND BRAZING: — Where items are described as welded or brazed, rates must include neat welding or brazing by experienced workmen using a recognised process and for cleaning and filing or grinding off smooth, all to approval. All welding is to be continuous unless otherwise described.

SCREW FIXINGS: — Where items are described as tap screwed, grub screwed, set screwed, etc. rates must include for the necessary screws, for drilling all components and for tapping the components where necessary to receive such screws.

PIPE MEMBERS: — All galvanized mild steel pipe members are to be "medium" pipes complying with SANS 1387. Diameters of pipes, unless otherwise stated, are normal internal diameters.

PRIMING OF STEELWORK: — All items of fabricated mild steel except where described to be galvanized, are to be cleaned in accordance with SANS Code of Practice 064 to remove all scale, rust, grease, oil, etc. endeavouring to bring the surface to a bright metallic condition, and painted, unless otherwise specified, with one coat of red-oxide zinc chromate primer in accordance with SANS Specification 909 prior to despatch from the works.

GALVANISING OF STEELWORK: — All steel surfaces described to be galvanized are to be thoroughly sand, grit or steel shot blasted to white metal in accordance with SANS Code of Practice 064 and fluxed ready for galvanising, and the completed unit is to be hot dip galvanized after fabrication in accordance with SANS Specification 763 for general applications on the relative thicknesses of metal.

The zinc coating shall be continuous and of even thickness over all surfaces entirely free of bare spots, dull, rough patches, blisters and other imperfections and shall show no signs of peeling. Where site welding has to be done, the welds are to be properly cleaned down and cold galvanized to the approval of the Department.

If requested by the Department, the manufacturer shall carry out tests to prove that the requisite mass / thickness of zinc coating is applied and that it is of uniform thickness. The tests shall be made by attaching a test piece of mild steel, approximately 250 x 25 x 6mm, by means of wire, to an article being galvanized, and subjecting the test piece to the same cleaning, fluxing and galvanising treatment as the article being galvanized, and at completion, the test piece tested by a method approved by the South African Bureau of Standards, the cost of which will be borne by the Contractor.

CHROMIUM PLATING OF STEELWORK: — All items of fabricated mild steel described to be chromium plated are to be properly de-greased, cleaned and polished perfectly smooth before plating and all in accordance with SANS Specification 728. All items are to be first nickel-plated then chromium plated to provide a bright mirror finish and all plating is to be equal to sample to be submitted for the necessary approval by the Department.

PRESSED STEEL DOOR FRAMES: — shall be manufactured from mild steel sheet 1.60mm thick for single rebated frames and 1.20mm thick for double rebated frames. Rebates shall be suitable for 42mm thick doors and fanlights.

The sections are to be accurately bent to form the profiles. Corners are to be mitred and welded and reinforced at back with 1.60mm thick steel angle sections. Transoms for

fanlights are to be let into the jambs and welded. All welds are to be solid and cleaned off flush, leaving a perfect outside finish.

Each frame is to be fitted with one pair of sturdy angle or channel section tie bars at base, welded below the frame, and where required for additional strength, cross struts of the same section are to be welded between and at right angles to the main tie bars. Each frame is also to be fitted with one 'diagonal brace as temporary support, standard 230mm long corrugated adjustable building-in lugs at jambs, three rubber shock absorbers in rebate of lock jambs of frames for single doors and one rubber shock absorber, for each leaf in the rebate of the head or transom of frames for double doors.

All frames are to be primed on all surfaces with an approved red oxide zinc chromate priming coat in accordance with SANS Specification before leaving the manufacturer's works, unless specified to be hot dip galvanized, and rates are to include for touching up where necessary with similar primer after building in.

Where frames are specified to be galvanized they are to be hot dip galvanized after manufacture in accordance with the relevant provisions of SANS Specification 763 for general applications on the relative thicknesses of metal.

Frames, unless otherwise described, are to be fitted with one and a half pairs of 100mm five-knuckle loose pin steel hinges, unless otherwise specified for each door or each leaf of double door and with one pair of 75mm five-knuckle loose pin steel hinges for each fanlight. The three-knuckle leaf of each hinge is to be welded into the frame or transom.

Where frames are described to be fitted with brass butts, the frames are to be checked out and fitted, unless otherwise specified, with one and a half pairs of 100mm double bronze washered brass butts for each door or leaf of double door, unless otherwise described, as one pair of 75mm brass butts for each fanlight, with open leaf of each butt secured to the frame or transom by means of 6mm diameter countersunk headed brass set screws screwed to and including a 3mm thick steel backing plate of suitable size welded to frame or transom and drilled and tapped to receive the set screws.

Where frames are described to be fitted with aluminium hinges the frames are to be checked out for and fitted, unless otherwise specified, with one and a half pairs of 100mm five-knuckle aluminium hinges of 6082 alloy with nylon bushes for each door or leaf of double door, unless otherwise described, and one pair of similar hinges to each fanlight, with the three-knuckle leaf of each hinge secured to the frame or transom by means of 6mm diameter countersunk headed stainless steel set screws screwed to and including a 3mm thick steel backing plate of suitable size welded to frame or transom and drilled and tapped to receive the set screws.

Where frames are to be prepared for the top centres of floor spring hinges, a 6mm thick steel backing plate of suitable size is to be welded into the back of the frame and drilled and tapped to receive the fixing screws of the top centre.

The preparation of frames or all items of ironmongery, other than butts, has been measured separately and the rates against these items are to include for all drilling, mortising, tapping for screws, etc. required for the fixing of keeps, brackets, etc. of the items of ironmongery described. Preparation of frames for locks and latches is to include, in addition to the above, for recessing and fitting the frames with and including standard keeps and adjustable striking plates to suit the types of locks and latches used and with totally enclosed mortar guards 1, 15 metre high above finished floor.

Door and fanlight sizes are given to the nearest 10mm. The building in of frames has been measured separately.

STAINLESS STEEL DOOR FRAMES:- shall be manufactured from grade 304 stainless steel sheet 1.60mm thick for single and double rebated frames to profiles as per detailed drawings. Rebates shall be suitable for 42mm thick doors and fanlights. Stainless steel

frames to be used only in Patient Treatment facilities.

PRESSED STEEL CUPBOARD DOOR FRAMES: — shall be manufactured from 1.20mm thick mild steel sheet standard sections, having rebates for 42mm thick doors, and fitted with transoms and/or mullions where required and with sill section allowing the cupboard doors to be taken down to general floor level with the floor level inside cupboards not less than 12mm above general floor level. The frames are to be 102mm wide overall.

The sections are to be accurately bent to form the profiles. Corners are to be mitred and welded and reinforced at back with 1.60mm thick steel angle sections. Transoms, mullions and sills are to be neatly fitted at intersections and welded. All welds are to be solid and cleaned off flush, leaving a perfect outside finish.

All frames are to be fitted with rubber shock absorbers to the lock jambs of single doors, and to the head, transom and sill of double doors. Each door is to be fitted with standard corrugated adjustable building in lugs at jambs.

All frames are to be primed on all surfaces with an approved red-oxide zinc chromate priming coat in accordance with SANS Specification 909 before leaving the manufacturer's works, unless specified to be hot dip galvanized, and rates are to include for touching up where necessary with similar primer after building in.

Where frames are specified to be galvanized they are to be hot dip galvanized after manufacture in accordance with the relevant provisions of SANS Specification 763 for general applications on the relative thicknesses of metal.

Frames are to be fitted with one pair of 100mm five-knuckle loose pin steel hinges for each lower door or each leaf of lower double door and with one pair of 75mm five-knuckle loose pin steel hinges for each upper door or each leaf of upper double door. The three-knuckle leaf of each hinge is to be welded into the frame or mullion. Frames for single cupboard doors shall be prepared for locks or catches as specified and the frames for double doors are to be prepared for two barrel bolts for the first closing leaf of lower doors and one barrel bolt for the first closing leaf of upper doors.

Overall sizes are given to the nearest 10mm. Building in of the frames has been measured separately.

STEEL WINDOWS AND DOORS: — shall be in accordance with SANS Specification 727 and the frames are to be provided with fixing lugs or are to be holed for screwing as required.

Industrial type windows are to be suitable for glazing from the inside and all other windows from the outside, unless otherwise described.

Side hung and vertically pivot hung sashes shall open to at least 90 degree horizontally pivot hung sashes to at least 80 degree and bottom hung sashes to 30 degree. Unless otherwise stated, hinges for side hung opening out sashes are to be of the projecting type for easy cleaning.

All opening sashes are to have polished brass furniture.

The transoms and mullions of all purpose-made windows and doors are to be equally spaced between the outer frames of the windows and doors to form openings of equal size. Where this is not the case either the width or the height of the opening is stated, unless otherwise stated, the fixed lights and sashes of all purpose-made windows are to be in one square and the sashes and doors are to open out.

Windows and doors, unless otherwise specified, shall be of "one piece" construction. Composite windows and doors are to be supplied complete with all necessary standard coupling transoms or mullions.

Stock and purpose made residential type steel windows and school type windows of residential section shall be constructed of standard 25mm steel sections and of metal not less than 3mm thick.

Stock and purpose made industrial type steel windows shall be constructed with main frames of standard 35mm steel sections and of steel not less than 3mm thick, with sashes of standard 25mm steel sections and of steel not less than 3mm thick.

"Universal" sections, where specified, shall be not less than 33mm wide (measured over one opening section only) and of metal not less than 4mm. thick, and with all sight lines maintained (whether consisting of all fixed lights, all opening sashes, or portions of both) and with all glass in the same plane.

Stock and purpose made steel doors, sidelights and fanlights, shall be constructed with the doors of "Universal" sections as before described and the sidelights and fanlights of standard residential sections as before described. Bottom openings in doors and sidelights shall be fitted with kicking plates of one thickness of 1.60mm mild steel sheet fixed with metal beads. Frames of outward opening doors shall be fitted with bottom sills of door framing section (stepped sills) and of inward opening doors with metal ties welded to frames for embedding in threshold (flush sills)

Top Hung Sashes: — are to open out on a pair of steel hinges having brass pins and washers and fitted with brass peg stay, steel peg and locking bracket.

Outward Opening Side Hung Sashes: — are to open out on a pair of steel projection hinges having brass pins and washers and fitted with brass two-point handle and brass striking plate and brass sliding stay with friction fastener.

Inward Opening Side Hung Sashes: — are to open in on a pair of steel hinges having brass pins and washers and fitted with brass single point handle and steel engaging hook and brass sliding stay with friction fastener.

Bottom Hung Sashes: — are to open in on a pair of steel hinges having brass pins and washers and fitted with steel concealed side arms with brass guides and brass spring catch for long arm or hand operation and steel catch plate.

Horizontally Pivot Hung Sashes: — are to have brass adjustable friction ring centres and fitted with brass spring catch for long arm or hand operation and steel catch plate.

Projected Out Sashes: — are to be balanced on steel concealed side arms, the top of the sash fitted with spring loaded brass shoes to slide in brass guides and fitted at bottom with brass handle and brass striking plate.

Doors: — are to be hung on one and a half pairs per leaf of steel projection hinges with brass pins and washers and fitted with mortise lock set as specified, and each lock is to be provided with two keys.

Brass concealed bolts are to be fitted at top and bottom of meeting edge of first closing leaf of double doors. Sidelights and fanlights are to be hung as described for windows.

Adjustable Louver Sets: — are to be natural anodised aluminium louver sets of approved manufacture consisting of head and sill weather strips complete with neoprene gaskets and two jamb strips each fitted with louver brackets with spring loaded clips for the specified width of glass louver blades complete with tilt bars and operating lever handles. Where openings are not of a height to suit standard width louver blades an alternate head section with static clips must be provided to take a fixed louver blade of the required width. The louver sets are to be screwed to the steel window frame with stainless steel self-tapping screws and all portions of the louver set which come in contact with the window frame are to be insulated with approved pressure sensitive PVC tape to prevent electrolytic corrosion.

Burglar Bars: — are to be standard type burglar bars formed of 20 x 5mm mild steel bars riveted at intersections and riveted at ends to the window frames. The burglar bars to the small-pane type windows are to line through with the glazing bars and windows of the horizontal-pane type or of the no-glazing bar type are to be fitted with burglar bars which are divided as for the small-pane type window.

Fly screens: — are to be standard type fly screens suitable for residential opening-out type steel windows, unless otherwise described, and are to be constructed of stove enamelled pressed steel frames fitted with 0.25mm thick mosquito-proof mesh glass-fibre gauze. The fly screens are to be clipped onto the inner face of the steel window after all painting is completed.

All steel windows and doors are to be primed on all surfaces with an approved red oxide zinc chromate priming coat in accordance with SANS Specification 909 before leaving the manufacturer's works, unless specified to be hot dip galvanized, and rates are to include for touching up where necessary with similar primer after building in.

Where steel windows and doors are specified to be galvanized they are to be hot dip galvanized in accordance with the relevant provisions of SANS Specification 763 for general applications on the relative thicknesses of metal.

Loose metal glazing beads, where specified, are to be of an approved type and size, and are to be fixed with screws set in the correct positions for the type of glazing to be used, and neatly mitred at angles.

Immediately the windows and doors have been delivered on site, they are to be thoroughly overhauled and all necessary adjustments or repairs are to be made before they are fixed in position. A further inspection is to be made after building in and any further servicing required must be carried out in order to leave windows and doors in a satisfactory condition after glazing is completed.

All glass and glazing has been measured elsewhere.

Sizes of windows and doors are given to the nearest 10mm. The building in of windows and doors has been measured separately.

STAINLESS STEEL: — is to be of the thickness and grade specified and unless otherwise stated is to be buffed to an even satin finish to the approval of the Department.

All welding to stainless steel shall be by argon arc process and where filler rods are used these are to have properties not less than those of the parent metal. All welds are to be ground off smooth and uniform and the whole buffed to an even finish all over. Stainless steel is to be cut and bent in such a manner that a minimum of welding is required.

Where bending is required, all external angles are to be arras rounded and all internal angles are to be radiused.

All stainless steel work is to be of the highest quality and executed by specialists in this type of work and to the approval of the Department.

Note that where stainless steel fittings are specified and support work or fixings with bolts, nuts, rivets, etc, are required / specified, these fixings and support work are to be of stainless steel of the same rating / grade as the equipment specified.

ALUMINIUM AND ANODISED ALUMINIUM: — is to be of the brand specified or other approved and of 6063-TF or equivalent quality and temper.

Aluminium bars and sections shall comply with the relevant clauses of SANS 1476, extruded tube and hollow sections with the relevant clauses of SANS 1474, and sheet and

strips with the relevant clauses of SANS 1470. All alloys to be anodised are to be of anodising quality.

Aluminium is to be free from flaws, hammer and die markings or other imperfections.

Anodising of aluminium is to be carried out in accordance with SANS Specification 999 by an approved process. The average anodic film thickness shall be 25 micrometer, and at no point should the anodic film thickness fall below 22 micrometer or be thicker than 30 micrometer.

Prior to anodising, all surfaces are to be de-greased and cleaned, all irregularities removed and flushed off smooth and buffed where necessary.

All anodised aluminium must be coated with a suitable "non-yellowing" methylcrylate lacquer film, approved by the Department, over the entire surface. The lacquer film must be continuous and of a uniform average thickness not less than 10 micrometer. The lacquer thickness must be determined by use of a film meter or other instrument methods as described in ASTM B244-49T. Rates for anodised aluminium must include for this protective coating.

Before the work is put in hand, samples of finish are to be submitted to the Department for approval, and all finished work is to be equal in all respects to the approved samples.

The Contractor shall provide all samples required for testing in accordance with SANS Specification 999. If required, tests on the anodic film are to be carried out at the works of the anodised to verify that the work conforms to SANS Specification 999, the cost of which will be borne by the Contractor.

The surfaces of all aluminium which are jointed to or are in contact with other materials when fixed, particularly ferrous metals, are to be suitably insulated to prevent electrolytic corrosion.

Joints in all aluminium members are to be neatly formed in an approved manner with screw heads, pins, rivets, etc. concealed so that the joints are practically invisible. Screw or bolt jointing is to be kept to a minimum and will be permitted only when welding is impracticable. Unless otherwise described, stainless steel screws or bolts are to be used for jointing and fixing aluminium work. Welded joints are to be formed by argon arc process using SANS 1476/NS6 welding rods and finished off smooth.

Welding is to be executed in such a manner as not to affect the colour of the material or the anodic coating.

Exposed heads of screws, pins, rivets, etc. in coloured anodised aluminium are to be touched up with enamel paint to match the coloured anodised finish.

No deviation may be made from the general requirements or dimensions, but improvements in the general construction and design affecting neatness, strength or durability may be introduced. If any deviation is proposed, the Contractor must submit detailed drawings showing the particular construction and form or section he proposes to use and such drawings, details and samples of fittings, etc. are to be approved by the Department before manufacture is commenced and every facility must be given for the work to be inspected during manufacture.

No work may be fixed in position until it has been inspected and approved. Anodised aluminium work must be erected as near to the end of the Contract period as possible, to minimise the danger of damage or deterioration.

All work is to be suitably protected during building operations and left in a clean and satisfactorily finished condition on completion. In particular, all anodised aluminium work must be protected against damage, and against deterioration or discolouration caused by

mortar droppings, wax, paint, etc. all to the entire satisfaction of the Department. All work so damaged, deteriorated or discoloured must be replaced at the Contractor's expense.

Rates for aluminium work are to include for necessary cutting to lengths, shaping, turning, threading, forging, fitting, assembling, riveting, welding, welded running joints, filing smooth, also for all screws and holes and hoisting and fixing in position. All screwed work is to have full threads.

ANODISED ALUMINIUM WELDED WINDOWS AND DOORS: — are to be of an approved manufacture and design.

Windows and doors are to be fabricated from Medium Universal equal leg sections, unless otherwise specified, measuring 33mm over one opening section and not less than 4mm thick through the flanges and not less than 4.75mm through the web, unless otherwise stated.

The aluminium sections are to be of approved manufacture and of 6063-TF or equivalent quality and temper and are to be anodised after manufacture to the approval of the Department. Welds are to be electrically flash butt resistance welded, properly ground and cleaned off to give a uniform appearances.

Anodising, etc. is to be carried out as before described.

All windows and doors are to be suitable for internal glazing and are to be fitted with approved anodised aluminium glazing beads of the "clip on" type. Drilling for the fixing of glazing beads is to be done to suit the thickness of the glass used.

The frames are to be perfectly flat, square, butt-welded at joints (mechanical joints will not be permitted) and all opening sashes must fit perfectly on all faces and open or close freely without binding at any point. The glazing bars must be continuous with continuous intersections (mitred intersections will not be permitted) with ends scribed and fitted to the frames with shouldered ends passed through and riveted over. The sight lines of the main frame, whether consisting of all fixed lights, all opening sashes or portions of both and the glass plane must be the same throughout each window.
Weathering on sections is to be solid extruded with the sections (screwed or riveted on strips will not be permitted) except weather bars to sills of inward opening sashes which must be welded on and not screwed or riveted except in the approved designs of built-up transoms.

No steel is to be used in the manufacture of the windows unless it is stainless steel of quality to A.I.S.I. Type 316. All fittings, butt hinges, screws, nuts, bolts, etc. are to be of high quality aluminium or other approved non-corrosive material compatible with aluminium and of sufficient strength to perform the functions for which they are used. The handles, sliding stays and peg stays are to have nylon washers, bushes and pressure pads and are to be secured to the frames with screws having riveted ends. Pop rivet fixings will not be permitted.

The transoms and mullions of all purpose-made windows and doors are to be equally spaced between the outer frames to form openings of equal size. Where this is not the case, either the width or the height of the opening is stated. Unless otherwise stated, the fixed lights and sashes of all purpose-made windows and doors are to be in one square and the sashes and doors are to open out.

Frames must be provided with suitable fixing lugs bolted on to frame with aluminium alloy bolts or are to be holed for screwing as required with lugs or holes spaced one near top, one near bottom and not more than 750mm apart intermediately each side of frame. Frames more than 900mm wide are to be provided with similar fixings to top and bottom and not more than 750mm apart.

All composite windows, doors, etc. are to be supplied with suitable and approved coupling mullions or transoms. Rectangular hollow section transoms where specified are to be

25mm x 115mm in section manufactured from 3mm thick aluminium.

The Contractor must submit drawings showing details of sections he proposes to use and these drawings are to be approved by the Department before manufacture is commenced, and when requested, specimen windows and doors complete with all fittings as well as specimen coupling mullions, transoms etc. must be submitted for approval and all windows, doors, etc. supplied must conform to the approved samples.

The manufacturer of the windows and doors must supply a dimensioned set of drawings with the windows and doors, for use on the site, including clearance and strict fixing methods and details.

Windows and doors are to be delivered to the site in suitable protective wrappings or crates and are to be stacked on end and carefully handled at all times to prevent any marking or staining of surfaces.

Immediately the windows and doors have been delivered on the site, they are to be thoroughly overhauled and all necessary adjustments or repairs are to be made before they are fixed in position. A further inspection is to be made after fixing and any further servicing required must be carried out in order to leave the windows and doors in a satisfactory condition and waterproof after glazing is completed.

Side Hung Sashes: — are to open out on a pair of aluminium hinges complete with anti-friction weatherproof bushings fixed pin and nylon washers and fitted with anodised aluminium alloy sliding stay with friction fastener and an approved anodised aluminium two point handle and striking plate.

Bottom Hung Sashes: — are to open in on a pair of aluminium hinges complete with anti-friction weatherproof bushings, fixed pin and nylon washers and fitted with concealed side arms and strong lever action spring catch and keep.

Top Hung Sashes: — are to open out on a pair of aluminium hinges complete with anti-friction weather proof bushings, fixed pin and nylon washers and fitted with anodised aluminium peg stay with cranked locking stay.

Horizontally Pivot Hung Sashes: — are to be hung on a pair of approved weatherproof brass satin-chrome finished friction pivots of the greatest possible diameter permissible and fitted at top with strong lever action spring catch for long arm or hand operation and striking plate, unless otherwise stated.

Vertically Pivot Hung Sashes: — are to be hung on free pivot cups at the head incorporating nylon bearing sleeves and lever pivots at the sill and fitted with one two-point casement handle and striking plate.

Projected Out Sashes: — are to be balanced on approved concealed side arms with stainless steel shoes and channels and fitted at bottom with one approved bow handle with catch incorporated.

Projected In Sashes: — are to be balanced on approved concealed side arms with stainless steel shoes and channels and fitted at top with strong lever action spring catch for long arm or band operation and striking plate:

Doors: — are to be side hung to open out on one and a half pairs of aluminium hinges to each leaf complete with anti-friction weatherproof bushings, fixed pin and nylon washers and fitted with lock set as specified, and each lock is to be provided with two keys. Satin chrome finish flush bolts are to be fitted at top and bottom of meeting edge of first closing leaf of double doors.

Adjustable Louver Sets: — are to be approved anodised aluminium adjustable louver sets consisting of head and all weather strips fitted with neoprene gaskets and two jamb strips

each fitted with louver brackets with spring loaded clips for the specified width of glass louver blades and complete with tilt bars and operating lever handles. Where the openings are not of height to suit standard width louver blades an alternate head section with static clips must be provided to take a fixed louver blade of the required width. The sets-sets are to be tap screwed to the window frame with stainless steel self-tapping screws.

GLAZING TO DOORS / ALUMINIUM GLAZED SCREENS

No glazing permitted to any fitting below Lock Rail (ie 1,2m high.).

Burglar Bars: — are to be standard type burglar bars formed of 20mm x 5mm aluminium bars riveted at intersections and riveted at ends to the window frame with high strength aluminium rivets. The burglar bars to the small pane type window are to line through with the glazing bars, and windows of the horizontal-pane type or of the no-glazing bar type are to be fitted with burglar bars which are divided as for the small pane type window.

All exposed surfaces of anodised aluminium are to be protected by means of an approved fabric backed adhesive tape. The Contractor shall satisfy the Department that the tape he proposes to use can be easily stripped after long exposure to sunlight, and rates are to include or the final stripping of the protective tape and cleaning dawn to approval at completion.

All work is to be protected during building against deterioration or discolouration caused by mortar droppings, wax, paint, etc. and all work so damaged is to be replaced at the Contractor's expense to the approval of the Department.

All glass and glazing has been elsewhere measured. All sashes and openings, unless otherwise stated, are to be single panes without glazing bars.

All windows and doors must be fixed into preformed openings in the structure (the building-in of windows and doors will not be pen fitted) and rates are to include for supplying necessary templates for forming the openings. Fixing in position of windows and doors has been measured separately. Sizes of windows and doors are given to the nearest 10mm.

STRONG ROOM DOORS: — must comply in all respects with SANS Specification 1015 Category 1. Each door is to be provided with two keys and the keys must be forwarded by the supplier under registered cover direct to the Department, and the supplier must clearly indicate the institutions in which the door (or doors) is being installed.

BURGLAR RESISTING SAFES: — must comply in all respects with SANS Specification 751. The safes shall be "Office Safe Category 1" as laid down in SANS Specification 751. Each safe is to be provided internally with one shelf and two lockable drawers.

Where the mass of each safe is 680kg or less, provision must be made for securing it rigidly to prevent unauthorised removal; the means of securing shall be at least equal in effectiveness to that which would be provided by four 12mm bolts. Locks shall be lever locks with a minimum of six levers. Each safe is to be provided with two keys to each lock and the keys for any safe must be forwarded by the supplier under registered cover direct to the Department, and the supplier must clearly indicate the institution in which the safe (or safes) is being installed.

ADJUSTABLE LOUVER GEAR SETS: — are to be approved natural anodised aluminium adjustable sets consisting of head and sill weather strips fitted with neoprene gaskets and two jamb strips and fitted with sets brackets with spring loaded clips for the specified glass sets blades and complete with tilt bars and operating handles. Where the openings are **not** of a height to suit standard width sets blades an alternate head section with static clips must be provided to take a fixed sets blade of the required width.

RATES: — are to include for fixing in accordance with the manufacturers instructions for screwing head and sill weather strips and jamb strips with stainless steel screws to frames (Elsewhere measured) and for oiling and easing at completion.

12. PLASTERING

MIXING
The mixing of the materials is to be done on a hard surface.
Once all materials have been mixed, they are not to be remixed with new materials added after 5 (five) hours.

MATERIALS
Stone Chippings: — are to be approved clean stone chippings of the sizes stated complying with SANS Specification 1083.

River Sand: — for floor finishes and screeds is to be clean, sharp, coarse sand free from all impurities, washed if so directed and complying with SANS Specification 1090.

Plaster Sand: — is to be clean, sharp, free from all impurities, washed if so directed and is to comply with SANS Specification 1090.

Cement: — unless otherwise specified is to be Portland cement of normal setting quality, is to comply with SANS Specification 471, and must be used fresh. Cement containing more than 15% blast furnace slag will not be permitted to be used.

Lime: — is to comply with SANS Specification 523.

Water: — is to be clean, fresh and free from injurious amounts of acids, alkalis and other organic substances.

MEASUREMENT OF CONSTITUENT PARTS OF FLOOR FINISHES, TOPPINGS, SCREEDS AND PLASTER FINISHES: — Cement, sand and stone chippings are to be measured exactly by means of gauge boxes or purpose made wheelbarrows. Part filling or heaping of normal wheelbarrows will not be permitted.

Water is to be accurately measured for each batch, to approval.

Waterproofing compounds, where specified, are to be added to the mixture in the proportions recommended by and in strict accordance with the manufacturer's instructions.

PREPARATION OF SURFACES: — Prior to the application of floor finishes, toppings, screeds, plaster finishes etc. the surfaces of the new or existing concrete, brickwork, etc. are to be thoroughly cleaned, chipped, hacked, sloshed, etc. as necessary to ensure a satisfactory bond. The Contractor will be held entirely responsible for the proper and adequate preparation of the surfaces and any work which results in failure in this regard must be made good at the Contractor's expense to the satisfaction of the Department.

FLOOR SCREEDS, ETC: — Cement screeds are to consist of one part cement and three parts sand, unless otherwise described, and are to be steel towelled, unless otherwise stated, to true smooth and even surfaces, free from tool marks to the satisfaction of the Department to receive the finishes stated in the items. It is recommended that in new structures the screeding should be as specified by "Tal" using "Screedmaster", the pumped method.

GRANOLITHIC FINISH TO CONCRETE FLOORS, ETC: — Float up to within 6mm of finished surface with layers on concrete approximately 10mm thick, composed of one part cement, two and a half parts concrete and three and a half parts granite or other approved hard stone chippings. Form finished surface with one part cement and one part fine granite chippings or other approved hard stone graded up to particle, which will pass a 6mm mesh brought to a smooth surface with a steel trowel. The floating and finishing coats are to be performed in one operation.

The granolithic work is to be carried out by experienced workmen and is to be laid in panels

V-jointed and not and not exceeding $6m^2$ in area or as shown on drawings or described in the Bills of Quantities.

Thin strips if wood or other suitable materials are to be laid between panels to break contact.

Where granolith is described to be tinted, the requisite quantity of oxide of iron or other colouring materials is to be mixed with the finishing thickness.

All granolithic floors, etc. are to be covered up and protected from injury and discolouration during the progress of the work.

Rates for granolithic work are to include for cleaning down and for a coat of approved wax polish or stoep reviver well rubbed in at completion.

13. PLASTER

GENERAL

Except where otherwise described, all external plaster is to be finished with a wood float and internal plaster is to be finished with a steel trowel, unless otherwise described, all to true and even surfaces, free from tool marks and other defects to the satisfaction of the Department. No distinction has been made for brick or concrete surfaces.

CEMENT PLASTER

External cement plaster to wall is to consist on one part cement and four parts sand.

External cement plaster to ceilings is to consist of one part cement and three parts sand.

Internal cement plaster to walls is to consist of one part cement and five parts sand.

Internal cement plaster to ceilings is to consist if one part cement and three parts sand.

One coat cement plaster to walls shall not be less than 13mm or more than 16mm in thickness, and one coat cement plaster to ceilings shall not be less than 10mm or more than 13mm in thickness, unless otherwise described.

Where plaster is described as undecorated, the same type of approved sand the same brand of cement is to be used throughout to maintain a uniform colour and texture.

BARIUM PLASTER

Barium plaster shall consist of two coats plaster, the first coat 13mm thick consisting of one part cement and five parts sand, and the second coat 6mm thick consisting of one part cement and five parts Barium Sulphate. (This is to be applied only to X-Ray Room walls where holed bricks have been used).

All surfaces are to be plastered in one operation from ceiling to floor and corner-to-corner; breaks are to be made only in corners or at junctions of walls and ceilings.

CURING, PROTECTION, ETC.: — All floor finishes, paving, plaster finishes and screeds are to be properly cured to approval and all cracks, blisters and other defects which may occur are to be made good and the whole left in a satisfactory-condition at completion.

The finished surfaces are to be properly protected from damage and cleaned down at completion.

RATES: — Rates for floor finishes and screeds are to include for preparation of new or existing surfaces, dressing to falls where required, V-joints where specified, curing, protecting from damage and cleaning down at completion.

Rates for skirtings, risers, etc. are to include for internal angles at junction with floor, treads, etc. to be square or coved to not more than 50mm girth and in addition are to include for mitres, stops, etc. except where given separately in terms of the Standard System of Measuring Builders' Work.

Rates for plaster finishes are to include for preparation of new or existing surfaces, curing, protecting from damage and cleaning down at completion.

Rates for plastering are to include for internal angles to be square or coved to not exceeding 50mm girth.

Rates for rounded angles, fair edges and arrases and the like are to include for mitres, stops, etc. except where given separately in terms of the Standard System of Measuring Builders' Work.

Rates for mouldings, projecting bands, coves, weatherings and the like are to include for dubbing out.

Rates are to include for cutting back against frames and for V-joints cut where concrete abuts brickwork.

Rates generally are to include for all sundry making good and working around pipes, balusters, etc.

GENERALLY

Narrow Widths
Items described as "Extra over for narrow widths" include for all reveals, edges, soffits, treads, risers, etc. not exceeding 500mm wide, narrow widths not exceeding 500mm wide in general surfaces caused by openings or projections, all of which have been included in the areas of horizontal or vertical surfaces. No distinction has been made for finishes of differing thicknesses.

14. TILING

MATERIALS

River Sand: —is to be clean, sharp, coarse sand, free from all impurities, washed if so directed and complying with SANS Specification 1090.

Plaster Sand: — for wall backings is to be clean, sharp, free from impurities, washed if so directed and complying with SANS Specification 1090.

Cement: —unless otherwise specified, is to be Portland cement of normal setting quality complying with SANS Specification 471 and must be used fresh. Cement containing more than 15 % blast furnace slag will not be permitted to be used

Water: —is to be clean, fresh and free from injurious amounts of acids, alkalis and other organic substances.

MEASUREMENT OF CONSTITUENT PARTS OF BACKINGS, ETC.: — Cement and sand are to be measured exactly by means of gauge boxes or purpose made wheelbarrows. Part filling or heaping of normal wheelbarrows will not be permitted:

Water is to be accurately measured for each batch to approval.

Waterproofing compounds, where specified, are to be added to the mixture in the quantities recommended by and in strict accordance with the manufacturers' instructions.

PREPARATION OF SURFACES: — Prior to the application of the backing for tiles, the surfaces of the new or existing concrete, brickwork, etc. are to be thoroughly sloshed, etc. as necessary to ensure a satisfactory bond. The Contractor shall be held responsible for the proper and adequate preparation of the surfaces and any work which results in failure in this regard must be made good at the Contractor's expense to the satisfaction of the Department.

GLAZED CERAMIC WALL TILES AND FITTINGS: — shall comply with SANS Specification 22 of selected grade, free from defects and blemishes and of uniform colour.

Rates are to include for either bedding tiles on and including a solid cement mortar backing consisting of one part cement to three parts sand on brickwork or concrete, or fixed with an approved tile adhesive on and including a coat of cement plaster consisting of one part cement to five parts sand and finished to a surface to receive tiles.

Tiles are to have vertical and horizontal joints continuous with all joints solidly flushed up in neat white cement.

MOSAICS: — Glass or ceramic mosaics are to be of approved South African manufacture of the sizes and colours specified, fixed to paper panels for ease of handling.

Mosaics are to be bedded to a true even surface on and including a solid cement mortar backing consisting of one part cement and three parts sand on brickwork or concrete, or fixed with an approved mosaic adhesive on and including a coat of cement plaster consisting of one part cement to three parts sand finished to a surface to receive mosaics.

After setting, the paper panels are to be removed and all joints are to be solidly flushed up in neat white cement.

Samples of mosaics are to be submitted to the Department for approval before any work is put in hand.

UNGLAZED CERAMIC FLOOR TILES AND FITTINGS: — are to be unglazed acid and alkali resistant tiles and fittings of the types specified in the items, and of approved manufacture, uniform in size, shape and colour, free from cracks, twists and other defects and equal to samples to be deposited with and approved by the Department.

Floor tiles are to be laid with maximum 10mm wide joints continuous in both directions on and including a 15mm thick cement mortar bed consisting of one part cement to three parts sand, unless otherwise specified, to true levels and grades with the joints raked out and grouted up solid and flush pointed with an approved epoxy jointing compound.

Floor tiles are to be set out so as to have no long edges of tiles cut to suit room size.

RATES: — for tiles, mosaics, etc. are to include for all necessary preparation of surfaces, for laying in accordance with the manufacturer's instructions, all square cutting and waste and fitting, protecting from damage and cleaning down at completion.

Rates for tiles are also to include for laying, bedding, jointing and pointing as described and in accordance with SANS Code of Practice 0107 where applicable.

Rates for treads, risers, sills, copings, cappings, skirting etc. are to include for pointing to exposed edges and projecting soffits.

No distinction has been made for brick or concrete surfaces.

TRANSITION TRIMS:-
Aluminium Wide Tile-In Ramp splayed transition trims to be used at junction between ceramic / porcelain tiles and vinyl sheeting.

MOVEMENT JOINTS:-
Aluminium Structural Screed joints bolted to slab to be capable of total movement of minimum of 5mm either way with flexible PVC Hospital Insert.
Movement joints to be in high traffic area's as "Migua" FV35/1500 or "Kirk" ASSJ390H of approved height with hospital insert bolted to slab before screeding.
Metal movement joints in low traffic area's with hospital insert strips..

15. DRAINAGE AND PLUMBING

GENERALLY: —The Standard Preambles for other trades, with reference to Excavations, Concrete, Brickwork and Plastering, and, in particular for the full description intent and meaning of the classification for excavations, are to apply equally to this trade.

LICENSED DRAINLAYERS AND PLUMBERS: — Only licensed drain layers shall be employed on any drainage work and licensed plumbers on plumbing work.

SUBSOIL DRAINS

Unplasticised polyvinyl chloride (UPVC) slotted drainage pipes and fittings: — shall be of approved manufacture jointed in accordance with the manufacturer's instructions.

Pitch-fibre perforated or slotted drainage pipes and fittings: shall comply with SANS Specification 921 and shall be jointed in accordance with the manufacturer's instructions.

Filter fabric: — shall be non-woven, spun bonded, needle punched and continuous polyester fabric, resistant to the effects of alkalis, acids, saline solution and sunlight.

STORMWATER AND SOIL DRAIN PIPES

Reinforced concrete non-pressured pipes: shall comply, with SANS Specification 677 and must be Type SC of the class specified with spigot and socket ends with rubber insertion ring or with ogee joints with approved rubber collars. Pipes must be marked with the manufacturer's name, trade name or registered trade mark, nominal bore, class and type, date of manufacture, the letter "R" denoting reinforced and the SANS mark. Joints shall be made in accordance with SANS Code of Practice 058.

Unplasticised polyvinyl chloride (UPVC) drain and sewer pipes and fittings: — shall comply with SANS Specification 791. Joins shall be made with fittings in accordance with SANS Code of Practice 058.

CONCRETE BEDS AND ENCASEMENT TO DRAIN PIPES: — Where pipes are required to be bedded on concrete, the bed of concrete shall be Class B, a minimum of 500mm wider than the diameter of the pipe, laid to correct falls and levels with recesses formed in same for pipe joints including all necessary formwork and any additional excavation. The barrel of the pipe shall then be bedded on a thin cement mortar (1:3) bed and laid to falls. After jointing, the recesses previously formed shall be filled in with concrete Class B and the haunching or surrounding completed.

Where pipes are fixed vertically they shall be encased in concrete Class B having a minimum thickness of 150mm around the pipe and carried up to ground level and shall include for any necessary formwork.

PIPE LAYING: — All drain and sewer pipes are to be laid to a straight line to even gradients and jointed in accordance with SANS Code of Practice 058 except in the case of polyethylene or unplasticised polyvinyl chloride drain and sewer piping which is to be in accordance with SANS Code of Practice 01 12.

Before laying, each pipe shall be examined to ensure that the bore is clean and free of any foreign matter and shall be tested for soundness by striking with a wooden mallet, and any cracked or damaged pipes shall be rejected. Ends of all pipes must be clean before

jointing. Immediately after jointing a tight fitting wad or scraper shall be drawn several times through the bore of the pipe to ensure that it is left clean and free from obstructions. Whenever work is suspended, the open ends of pipes and junctions must be temporarily plugged to prevent the entrance of rubbish during construction.

GULLEY TRAPS: — Gulley trap assemblies must be of the material specified with "P" or "S" trap, jointed to drain and with hopper head with vertical and side inlets, the head fitted with 190mm diameter cast iron gulley grating complying with SANS Specification 1115 laid loose in socket. The trap, hopper head and vertical pipe shall be set on and encased in concrete Class B having a minimum thickness of 150mm at any one part, carried up 75mm above ground level as kerb, dished down to grating and finished on all exposed surfaces in 1:3 cement plaster with angles rounded, including necessary excavation and formwork.

GREASE TRAPS: — Grease trap assemblies of vitrified clay must consist of outlet junction jointed to trap with side inlet. Access openings of trap and junction shall be fitted with vitrified clay stoppers laid loose in socket of trap and set in bitumen in socket of junction. The trap and junction and vertical pipe shall be set on and encased in concrete Class B having a minimum thickness of 150mm at any one part, carried up 75mm above ground level as kerb, dished down to grating and finished, on all exposed surfaces in 1:3 cement plaster with angles rounded, including necessary excavation and formwork.

RODDING EYES: — Where pipes are carried up in ramps for rodding eyes, the head of the pipe at ground level must be fitted with an **"A.B.C."** cast iron cover and frame, complying with SANS Specification 746, jointed to pipe, the frame rebated for and including cover with raised letters "CE" cast on same, secured to frame with gun-metal screws and with the whole encased in concrete Class B having a minimum thickness of 150mm at any one part, carried up 75mm above ground Level and finished on all exposed surfaces in 1:3 cement plaster with angles rounded, including necessary excavation and formwork,

INSPECTION EYE BLOCKS: — Where inspection eye fittings are provided in pipelines, the position of these inspection eyes must be registered and demarcated with concrete Class C. block size 300 x 300 x 50mm thick finished on all exposed surfaces with 1:3 cement plaster with angles rounded and with sunk letters "I.E." formed in top and set in ground, including necessary excavation and formwork.

SURFACE WATER CHANNELS: —Concrete open surface water channels shall be formed with concrete Class B with segmental channel formed in same to the size and shape specified and finished on exposed surfaces in 1:3 cement plaster, steel towelled to a smooth even surface with all angles rounded, cast in lengths not exceeding 2m and laid to falls, including necessary excavation and formwork.

GRATINGS FOR GULLEYS AND STORMWATER DRAINS AND CAST IRON SURFACE BOXES AND MANHOLE COVERS AND FRAMES: — Cast iron or Polymer gratings for gulleys and storm water drains shall comply with SANS Specification 1115 and SANS 1882:2003 respectively.

Cast iron surface boxes and manhole covers and frames shall comply with SANS Specification 558.

All cast iron gratings, cast iron surface boxes and cast iron manhole covers and frame must be coated with approved preservative solution before leaving the manufacturer's works.

The masses stated are the combined mass of the grating and frame or the combined mass of the cover and frame.

STORM WATER SUMPS, JUNCTION BOXES, MANHOLES, INSPECTION CHAMBERS, CABLE INSPECTION CHAMBERS AND VALVE CHAMBERS: — shall be of the internal size specified and are to be constructed of one brick sides, unless otherwise specified, built in 1:3 cement mortar on a 150mm thick concrete Class C bottom and finished on top with an 85mm thick pre-cast concrete Class C cover slab, reinforced as detailed and bedded in

cement mortar. The cover slab, except to junction boxes, is to have a rebated opening formed in same, suitable for and fitted with a cast iron orating and frame, or cover and frame, of the size and mass specified with the frame bedded in cement mortar. The bottom of the sump, manhole, etc. and the exposed surfaces of the cover slab are to be finished smooth in 1:3 cement plaster with angles rounded. The internal brick surfaces are to be faced with smooth facing bricks and pointed with flush joints.

Inspection chambers and manholes with an invert not exceeding 1m shall have an internal dimension of 470mm x 700mm and those exceeding 1m shall have an internal dimension of 920mm X 920mm. Where the invert of the hole exceeds 1m, a 150mm thick reinforced concrete Class C corbel slab, reinforced as detailed, with opening size 470mm x 700mm formed in same and finished smooth off the formwork, is to be built into the brick sides at a height not exceeding 1, 5 inches above the concrete bottom with the reduced manhole shaft built off the top of the corbel slab. Cast iron step irons spaced at 300mm staggered centres vertically are to be built into one side of all manholes with an invert exceeding 1m.

Where measured in number, rates for all sumps, manholes, etc. are to include for excavating to the depths required, taking precautions against collapse of sides of excavations, staging, ramming, pumping and baling to keep excavations free from water or mud, filling around and ramming and depositing and levelling spoil on site or carted away as directed. Ends of pipes are to be built through the sides of the sumps, manholes, etc. and rates are to include for this.

SOIL DRAIN MANHOLES AND INSPECTION CHAMBERS: —are to be of the internal diameter and inverts specified and are to be constructed of pre-cast reinforced concrete manhole ring sections with walls a minimum of 50mm thick, pre-cast reinforced concrete cover slabs and spacer pieces complying with SANS Specification 677. The joints for the ring sections shall be of the ogee type. The bottom shall be of concrete Class C-cast in-situ.

The placing of the concrete bottom and benching shall be carried out in three stages with the initial stage being the laying of the concrete bottom projecting 100mm beyond the external diameter of the manhole on which is laid the inspection eye pipe, branches, etc. The second stage comprises the laying of concrete within the manhole to the height of the pipes and around the perimeter of the bottom to a height of not less than 25mm above the collar of the pipe at the highest end. This annular base is to be shuttered to provide a horizontal setting for the first ring section which is to be firmly bedded in the wet concrete. The third stage comprises the laying of the benching within the initial ring section and finished in 1:3 cement plaster with all angles rounded. Thereafter, the ring sections of the required standard height are joined together to form the required depth, with all joints primed with "Bituprime" and sealed with "Bitujoint Putty". A 125mm thick pre-cast reinforced concrete cover slab, rebated on underside to suit ring sections and with opening size 600mm x 600mm formed in same is to be bedded on top of the ring section. The shaft above the cover slab is to be constructed of either pre-cast reinforced concrete spacer units to suit the type of cast iron cover and frame specified, or one brick kerb walls faced internally with smooth facing bricks jointed with flush joints, and finished on top with an 85mm thick pre-cast concrete Class C cover stab, reinforced as detailed and bedded in cement mortar with the exposed surfaces finished smooth in 1:3 cement plaster with all angles rounded. The cover slab is to have a rebated opening formed in same suitable for and fitted with cast iron cover and frame of the size and mass specified, with the frame bedded in cement mortar.

MANHOLE COVERS AND FRAMES:- Cast iron, Concrete or Cultured Polymer covers and frames to be suitable for the area of usage.

SOAK PITS: — shall be of the lengths and widths specified and shall be a minimum of 900mm deep below the invert of the inlet pipe. A perforated pitch-fibre drainpipe, jointed to the inlet pipe and with other end capped, is to be laid level in a 19mm stone packing of a minimum thickness of 15mm below and at sites of pipe and a minimum thickness of 150mm below the top of the pipe. The remainder of the soak pit is to be filled with stone graded

from 50mm to 75mm, to a level of 50mm above the top of the pipe. The stone is to be covered with corrugated asbestos cement sheets extending 150mm beyond the walls of the soak pit all round. The trench shall be backfilled above the sheeting to a minimum depth of 300mm lightly rammed with the final 100mm of backfilling being approved topsoil from the excavations.

SEPTIC TANKS: —shall be of the internal sizes specified and are to be constructed of one brick sides built in 1:3 cement mortar on 150mm thick concrete Class C bottom laid to falls. A half brick baffle wall finished 75mm below underside of concrete cover slab and with opening size 150 x 150mm high formed in wall is to be built in 1:3 cement mortar on the concrete bottom. A 115mm thick reinforced concrete Class C cover slab, reinforced as detailed, is to be cast in-situ on removable formwork and is to have two openings formed in same, each suitable either for and fitted with 600 x 450mm x 38 kg cast iron single seal manhole cover and frame, or for the shaft of the inspection chamber built off the cover slab in one, brick walls in 1:3 cement mortar with smooth face bricks internally, finished on top with 85mm thick pre-cast concrete Class C cover slab, reinforced as detailed and rebated for and fitted with 600 X 450mm X 38-kg cast iron single seal manhole cover and frame. The bottom and sides of the septic tank are to be finished in 1:3 cement plaster, 19mm thick, with an approved waterproofing compound added, with all internal angles coved to 50mm radius. Inlet and outlet chambers attached at either end of the septic tank shall be size 600 x 450mm internally, of the depth required and each shall be constructed of one brick walls built in 1:3 cement mortar on a concrete Class C bottom 150mm thick, or where extended above the top of the septic tank cover, built off the cover and finished on top with 85mm thick pre-cast concrete Class C cover slab, reinforced as detailed and bedded in cement mortar with the exposed surfaces finished smooth in 1:3 cement plaster with angles rounded. The cover slab is to have a rebated opening formed in same suitable for and fitted with a 600 x 450mm x 38 kg cast iron single seal manhole cover and frame. Chambers shall be provided with inspection eye pipes or bends, straight or curved channel sections, benched up to sides of chambers in concrete Class C, finished in 1:3 cement plaster with all angles rounded.

The inlet and outlet of the septic tank shall be formed of cast iron square junction piece with tail-pipe extending 300mm below water level in tank, built in through end walls and jointed to channels in inlet and outlet chambers.

TESTING OF DRAINS, MANHOLES AND INSPECTION CHAMBERS: — All drains, manholes and inspection chambers with the exception of subsoil drains shall be constructed so as to be watertight. No trenches shall be backfilled or pipes encased in concrete until the drains have been tested and approved. Any drains covered by the Contractor prior to testing shall be exposed at the Contractor's expense.

The Contractor shall give at least 24 hours notice of any particular length between manholes ready for testing. The drains shall not be tested until a period of 24 hours, or such other period as may be required, has been allowed for the pipe joints to set. The Contractor shall provide all necessary testing apparatus, expanding plugs, stoppers, water and any other materials and all labour that may be required for carrying out the tests.

The whole of the drainage system shall be tested using one or more of the following tests:-

(a) **Visual test**— Each length of pipe shall be inspected for invert level grade, direction and line. Internal inspection of the bore of the pipes shall be made using mirrors and a powerful source of light. The drains must be free of invert lips and the bases of the pipes must be straight.

(b) **Air test** — All openings in the drain shall be plugged and sealed and all associated traps filled with water and air pumped into the drains until a manometric pressure of 40mm is indicated, after which, without further pumping, the pressure shall not drop below 25mm for a period of at least 30 seconds.
After the entire drainage system has been completed, all plumbing fittings installed and permanently connected up, and traps filled with water, a final air test shall be applied to the whole system.

(c) **Water test**— All openings-in the drain, except the highest one, shall be plugged and sealed and the drain filled with water so that every part of the system is tested under a head of water of not less than 1.5m and not more than 3.5m. After allowing period of 10 minutes for initial absorption, the amount of water it shall be necessary to add to maintain the water level over the next 15 minutes shall not exceed a rate of 25 litres for 100mm diameter pipe and 3,75 litres for 150mm diameter pipe for 100m of drain and an equivalent rate for larger drains. In carrying out the water test, the head of water shall be obtained by providing temporary pipes, fittings, etc. wherever necessary or by such other method as may be approved.

In cases where the maximum head of water, owing to the gradient of the drains, would be exceeded in any section, inspection eyes at suitable intervals may be provided and the drain plugged, in order not to subject the lower portion of the drain to a greater head of water than that required. Drains must be free of air before testing.

(d) **Manhole and Inspection Chamber test** — The inlet and outlet pipe hose shall be plugged and sealed and the inspection chamber filled with water. After allowing the water to stabilise due to absorption, the water level should not fall more than 5mm in 2 hours.

DEFECTS TO BE MADE GOOD: — Should the drain system fail to withstand the above tests, all defects shall be made good and the tests repeated at the Contractor's expense until the whole system is sound and passed to the satisfaction of the Department. In making good, all defective parts shall be cut out and replaced with new. No patching of pipes, joints or connections will be permitted.

SHEET METALWORK: — generally is to be lapped 75mm at ends and 150mm at angles, unless otherwise specified. Rates for sheet metalwork shall include for all labour, cutting and waste, laps, seams, welts, angles, clips, tacks, soldered dots, riveting, soldering, brazing, burning, nailing, dressing and wedging as required. All measurements are net with no allowance being made for laps, seams, welts, angles, clips and tacks or waste in cutting. Where stepped flashings are described as to flat slope, the pitch of the roof to which they apply does not exceed 40 degrees

(a) **Galvanized sheet iron**: — shall be of an approved brand of the thickness specified after galvanising and having a galvanized coating of "Iscor Coating Designation Z450". Corroded or otherwise defective sheets shall not be used. All nailing or screwing shall be done with galvanized nails or screws.

(b) **Sheet aluminium**: — shall be of the thickness and quality specified. All nailing shall be done with aluminium alloy nails and all screwing done with stainless steel screws.

(c) **Sheet copper**: — shall be cold rolled sheet of the thickness and temper specified. Sheet copper for covering flat roofs and for valley and gutter linings, flashings, soakers, etc. shall be of dead-soft temper and for eaves gutters, rainwater pipes and other unsupported or semi self-supported work shall be of half-hard temper. All nailing shall be done with copper or copper alloy nails and all screwing done with brass screws.

(d) **Sheet lead**: — shall be best milled sheet lead of the full mass specified and of equal thickness throughout and must comply with SANS Specification 1178.

LININGS TO VALLEYS: — shall be of the material specified, lapped 200mm at ends and dressed up on to purlins or battens at sides of valleys with edges bent back to form open beads.

LININGS TO SECRET GUTTERS: — at back of chimney stacks and wall abutments and at raking intersections of walls and roofs shall be of the material specified, turned 100mm up vertical surfaces and dressed 250mm up roof slope and on to purlin or batten at edge.

SOAKERS: — to slate covered roofs shall be of galvanized sheet iron or sheet copper of 0.6mm thickness, 450mm wide to closed valleys and 250mm wide to raking intersections of roofs with vertical wall and chimney stack abutments and turned 75mm up vertical surfaces. Soakers shall be 75mm longer than the gauge of the slate roofing.

UNDER-FLASHINGS: — to all iron roofs and where specified to slate or tiled roofs shall be 0.6mm thickness galvanized sheet iron. Flashings to asbestos cement roofs shall be asbestos cement preformed units fitted in accordance with the manufacturer's instructions. Where specified, copper flashings shall be formed from sheet of 0.6mm thickness and aluminium flashings shall be formed from 1200-H4 quality sheet of 0.6mm thickness. Lead flashings, where specified, shall be formed from sheet having a mass of 24 kg/in 2.

COVER FLASHINGS: — shall be either galvanized sheet iron, copper or aluminium, as specified, of 0.6mm thickness fitted over under-flashing, stepped where required on rake and with top edge bent and wedged 25mm deep into joint of brickwork or groove formed in concrete face and flush pointed in 1:3 cement mortar.

FLASHINGS AROUND PIPES THROUGH ROOF COVERINGS

(a) Pipes through preformed sheet steel roofing shall be flashed around with 0.6mm galvanized sheet iron apron pop-riveted to top of roofing wit edges cut and dressed to profile of roofing, soldered all round and with conical sheet iron 'u' stand, riveted and soldered at joint and at base to apron. The top of the conical upstand is to be fixed around the pipe with 25mm x 3mm galvanized mild steel strap wrapped around the pipe and fixed with a galvanized steel gutter bolt.

(b) Pipes through fibre cement roofing shall be flashed around with 24 kg/in 2 lead a on dressed into corrugations, bedded in mastic and bolted to roof sheeting with galvanized steel gutter bolts and with conical lead upstand, wiped on at joint with apron, and secured around pipe with copper wire.

(c) Pipes through slate or tile roofing shall be flashed around with 24 kg/in 2 lead apron dressed to profile of slates or tiles with top edge of lead apron dressed over back edge of slate or tile under overlap of slates or tiles. A conical lead upstand, wiped on at joint with apron, is to be secured around the pipe with copper wire.

(d) Pipes through pre-printed or embossed sheet steel or aluminium roofing shall be flashed around with flexible glass-fibre reinforced waterproofing dressed to profile of roofing, pop-riveted around edges to roofing and dressed up and around pipe. The waterproof is to be finished in a colour to match that of the roofing material.

RAINWATER PIPES

GENERALLY:

Full bore outlets for flat roofs are not allowed. Where flat roofs are specified, it is preferred to have a drain along the edges into a common outlet. Where roof cover is of 'Chromodek' sheets, the preferred guttering is of the same material in the same colour in continuous lengths.

(a) **Unplasticised polyvinyl chloride (UPVC) rainwater pipes and accessories** shall comply with SANS Specification 967 and must be fixed clear of the finished wall face on stock pattern brackets in accordance with the manufacturer's instructions.

(b) **Galvanized mild steel rainwater pipes**, shall be medium quality screwed and socketed normalised welded mild steel pipes, galvanized inside and outside, and shall comply with SANS Specification 62.

Fittings for galvanized mild steel pipes shall comply with SANS Specification 509. The screwed joints must be made with lead paint and hemp or approved thread sealing tape. The pipes must be fixed clear of the finished wall face with galvanized cast iron hinged

holderbats built into walls at not exceeding 2m centres in 1:3 cement mortar.

EAVES GUTTERS

a) **Galvanized sheet iron gutters, rainwater heads, etc.** shall be formed from 0.6mm sheet and must have beaded edges with all laps riveted and soldered. Corners must be reinforced with 0.6mm X 50mm wide galvanized sheet iron strips and must be soldered across the inside of the angles.

Gutters must be laid to even falls on approved galvanized mild steel gutter brackets screwed to roof timbers at approximately 1m centres. Half round pattern gutters shall be bolted to each bracket with 6mm galvanized gutter bolt fitted close to the beaded edge. Rectangular pattern gutters shall be fixed at each bracket with galvanized mild steel long-screw with 1mm thick galvanized sheet iron spacer tube.

(b) **Fibre cement gutters and accessories** shall be of approved manufacture, not less than 6mm thick, with spigot and socket joints made in an approved mastic compound in accordance with the manufacturer's instructions. Gutters must be laid to even falls on approved aluminium alloy or stock asbestos cement brackets screwed to roof timbers at the manufacturer's recommended spacings.

(c) **Unplasticised polyvinyl chloride (UPVC) gutters and accessories** shall comply with SANS Specification 11 and must be laid to falls and fixed on brackets in accordance with the manufacturer's instructions.

SANITARY PLUMBING AND FITTINGS, WASTE, VENTILATION AND ANTI-SIPHON PIPES

(a) **Unplasticised polyvinyl chloride (UPVC) pipes and fittings** shall be of approved manufacture marked with the manufacturer's name and trade name, the nominal bore and the South African Bureau of Standards mark and shall comply with SANS Specification 967. Joints shall be made with injection moulded fittings in accordance with the manufacture's instructions and SANS Code of Practice 0112. The pipes must be fixed clear of the finished wall face with aluminium alloy holderbats fitted with plastic cushion strips with the holderbats fixed to plugs in wall.

(b) **Polypropylene pipes and fittings** shall be of approved manufacture and shall have a mechanical form of jointing. Pipes and fittings are to be fixed and jointed in accordance with the manufacturer's instructions.

(c) **Multilayed pipes** shall be of approved manufacture and shall have a mechanical form of jointing. Pipes and fittings are to be fixed and jointed in accordance with the manufacturer's instructions.

SANITARY FITTINGS: — All sanitary ware must comply with SANS 497 Specifications and be fitted with Ball-O-Cock valves in supply lines.

Wash hand basins shall be of white glazed fireclay or vitreous china of the type and size specified. Basins shall have an integral overflow to non patient treatment facilities and be fitted with 32mm chromium plated waste union with flange and grating, rubber plug on chromium plated brass chain and, where required, tap hole stopper cemented in.

WC pans shall be of white glazed fireclay or vitreous china of the type specified with 'S" or "P" trap with straight or side outlet and shall be fitted with single or double flap plastic seat as required, secured to pan with concealed brass holding down bolts. Pans shall be bedded on the concrete floors in 1:3 cement mortars. Pans in seclusion rooms and other public areas to be 'Gypsy' vandal proof – or other approved.

Glazed ceramic urinals of the bowl or stall type shall be of white glazed fireclay or vitreous china. Bowl urinals shall be fitted with 40mm chromium plated waste union, with flange and

domical grating and with spreader with flush pipe connector. Stall urinals shall be fitted with 75mm chromium plated waste union with flange and hinged domed grating and with spreader with flush pipe connector.

Flushing cisterns shall be as specified, either of white porcelain enamelled cast iron, white glazed fireclay, vitreous china or black plastic complying with SANS Specification 821, each with body and cover. Cisterns shall be a maximum of 11 litre capacity and the flushing apparatus shall be of brass, copper or other corrosion resistant metal, PVC or other approved plastic or of an approved ceramic material. All cistern lids must be able to be **screwed** down. Connections for flush pipe, inlet and overflow pipe must be provided in the body. Cisterns shall be fitted with 15mm brass ball valve with copper, PVC or polystyrene ball and with either chromium plated operating lever handle or galvanized steel pull chain and handle. A galvanized, white enamelled or chromium plated steel or copper flush pipe, of the required length, as specified, is to be jointed to the flush pipe connection on the body of the cistern and in the case of WC pans is to be fixed to the inlet of the pan with an approved patent adaptor. From the overflow connection on each cistern a 22mm copper overflow pipe, bent as required, shall be taken through wall to discharge externally, with ends splay cut and projecting 50mm beyond wall face, or where this is not possible, bent to discharge into WC pan.

Baths shall be enamelled cast iron baths of the type and size specified, holed for and fitted with chromium plated brass overflow union with grating, 40mm chromium plated brass waste union with flange and grating, rubber plug on chromium plated brass chain and fitted with adjustable cast iron feet. The fall along bottom of baths from head ends to outlets must be adequate for complete emptying.

Stainless steel sinks and drainers shall be of the types and sizes specified with exposed surfaces buffed to a satin finish and sound deadened on underside by application of an approved sound deadening coating. Splashbacks with tiling keys shall be provided at back and at ends against walls or as specified. Sink bowls are to be pressed out of single sheets with complete drainage to outlets and each bowl is to be fitted with integral built-in overflow with chromium plated brass grating and 40mm recessed waste outlets with chromium plated brass waste union with grating, rubber plug and chromium plated brass chain. Sink bowls, unless otherwise specified, are to be 450 x 355 x 140mm deep. Drainers are to be pressed out of single sheets and are to have pressed flutes to give complete drainage.

(a) For domestic use — Sinks shall comply with SANS Specification 242 and shall be manufactured from A.I.S.I. Type 430 stainless steel 0.8mm thick for units not exceeding 2,4m long and from stainless steel 1.2mm thick for units exceeding 2,4m Long. -

(b) For hospital use and laboratories — Sinks shall be manufactured from A.I.S.1. Type 304 stainless steel 0.9mm thick for units not exceeding 2.4m long and from stainless steel 1.2mm thick for units exceeding 2.4m long.

Stainless steel wash hand basins and wash troughs shall be of the types and sizes specified complying with SANS Specification 906, with exposed surfaces buffed to a satin finish and sound deadened on underside by application of an approved sound deadening coating. Each basin or wash trough in non patient treatment area's are to be fitted with integral built-in overflow with chromium plated brass grating and 40mm recessed waste outlet with chromium plated brass waste union with grating, rubber plug and chromium plated brass chain.

Stainless steel urinals shall be of the types and sizes specified complying with SANS Specification 924 and shall be manufactured from A.I.S.I. Type 304 stainless steel, 1.2mm thick, buffed to a satin finish and sound deadened at back by application of an approved sound deadening coating. The back and sides of urinals are to be made rigid by means of integral pressed ribs or by bowing. Edges at sides and top are to have plaster key. Tread plates are to be ribbed and the front edges are to be stiffened and bent to form key for floor finish. The trough shall be a minimum of 125mm wide and half round in section with all corners radiused and shall fall to ensure complete drainage to 75mm recessed outlet with

chromium plated domed hinged grating and frame.

RATES FOR SANITARY WARE: — shall include for the supply and fixing of the units as specified and for cleaning, washing and leaving in a satisfactory condition on completion.

BELOW GROUND WATER RETICULATION

Unplasticised polyvinyl chloride (UPVC) piping and fittings shall be of approved manufacture complying with SANS Specification 966. Pipes must be of the class specified and must be marked with the manufacturer's name, trade name or registered trademark, nominal diameter, class reference and the SANS mark. Pipes shall be laid and jointed in accordance with the manufacturer's instructions.

High density polyethylene (HDPE) piping shall be of approved manufacture complying with SANS Specification 533 and shall be of the class specified, laid and jointed in accordance with the manufacturer's instructions. Piping must be jointed with compression fittings with compression rings and coupling nuts.

High Density Polyethylene / Polypropylene / Multilayed piping shall be of approved manufacture, complying with SANS Specification 15875-1-2004 & 2/2003 & 1315, laid and jointed in accordance with the manufacturer's instructions.

Copper piping shall be of approved manufacture complying with SANS Specification 460 and shall be of Class 2. Pipes must be jointed with brass compression fittings with compression rings and coupling nuts complying with SANS Specification 1067 Part I Type 'A'. Copper piping must be bent, where required, with an approved bending machine.

ABOVE GROUND WATER SUPPLIES

Colour Coding Cold Water Supply the exposed piping for this non potable (recycled) water shall be colour banded Brilliant Green (B49) / Yellow Band(H10).
The other exposed piping for potable (drinkable) water shall be colour banded Brilliant Green (B49) / Blue Band(F29)

Galvanized mild steel piping for water supplies shall be medium quality screwed and socketed normalised welded mild steel pipe, galvanized inside and outside, and shall comply with SANS Specification 62.

Fittings to galvanized mild steel piping shall be steel pipe fittings complying with SANS Specification 62 or malleable cast iron fittings complying with SANS Specification 509.

Copper piping shall be of approved manufacture, complying with SANS Specification 460 and shall be of Class 2 – fixed and jointed in accordance with the manufacturer's instructions. Class 2 copper piping must be jointed with brass compression fittings with compression rings and coupling nuts complying with SANS Specification 1067 part I Type 'A'.

Polypropylene / Multilayed Piping shall be of approved manufacture, complying with SANS Specification 1315, laid and jointed in accordance with the manufacturer's instructions. This applies to hot and cold water supply within ceiling spaces also.

Stainless steel piping shall be of approved manufacture, complying with SANS Specification 4127 and shall be A.I.S.I. Type 304 L. Fittings to stainless steel piping not exceeding 50mm nominal bore shall be brass compression fittings with compression rings and coupling nuts.

Piping exceeding 50mm nominal bore shall be welded piping with 1.5mm wall thickness, unless otherwise stated, and of A.I.S.I. Type 316 stainless steel. Joints are to comprise approved A.I.S.I. Type 316 stainless steel pressed collars welded to ends of pipes and fittings with loose galvanized mild steel slip-on flanges complete with galvanized mild steel bolts, nuts and washers, and neoprene gaskets. Fittings must be A.I.S.I. Type 316

stainless steel butt weld fittings.

Phosphoric acid based fluxes must be used for all welded joints which are to be argon arc TIG welded using Type 316 filler rods, with the welds treated with suitable pickling compound.

WATER TAPS AND VALVES: — Water taps, stopcocks, ball-o-cocks and wheel valves shall be of approved manufacture complying with SANS Specification 226.

Ball valves with brass valve and copper or plastic ball float shall be of approved manufacture complying with SANS Specification 1056. Plastic floats when supplied, must comply with SANS Specification 1006.

Full Bore Teflon Seated Ball Valve shall be of approved manufacture complying with SANS Specification 664. Valves shall be clockwise closing with non-rising, cap-fitted spindles and flanked connections and of the class specified.

Pressure reducing valves shall be of approved manufacture complying with SANS Specification 198.

FIXING OF WATER PIPES: — Galvanized mild steel water piping shall be fixed, unless otherwise described, to walls or ceilings with galvanized malleable iron holderbats (school board pattern), built into walls in 1:3 cement mortar. Pipes shall be fixed to timber work with galvanized mild steel pipe clips screwed on.

Copper and stainless steel water piping shall be fixed, unless otherwise described, to walls or ceilings with brass holderbats (school board pattern) built into walls in 1:3 cement mortar. Pipes shall be fixed to timber work with brass or copper pipe clips screwed on.

Polypropylene / Multilayed Piping - shall be fixed to walls according to manufacturers recommendations.

CONCRETE THRUST AND ANCHOR BLOCKS: — shall be of the sizes required and provided where directed to anchor the water pipelines against the thrust due to hydrostatic pressure. Concrete blocks shall be cast against the undisturbed face of the excavation. Backfilling behind the thrust face of the block will not be permitted.

TESTING OF WATER MAINS: — The whole of the water reticulation shall be subjected to a hydraulic test pressure 1.5 times the maximum working pressure of the pipeline. Testing of pipelines may only commence after the installation of all anchor blocks, valves and fittings have been completed. Testing shall be carried out between installed sluice valves whenever possible. Where this is not possible the ends of the pipes shall be sealed with end caps properly held in place with temporary props.

The tests shall be carried out on lengths not exceeding 300 metres.

The pipeline shall be filled from the lowest end in order to expel the air at the upper end through special taps or through service connections, stand pipes, etc. When full the line shall be allowed to stand for 24 hours and any further accumulated air shall be expelled. The full test pressure shall then be applied and maintained for one hour, during which time the line will be examined for any leaks, movement at anchors and other defects.

Any defective work is to be taken out and replaced at the Contractor's expense and the whole retested until found satisfactory.

The Contractor shall provide all necessary testing apparatus, temporary end caps, plugs, stoppers, special taps and any other materials that may be required, and all labour for carrying out the tests.

EXCAVATIONS FOR PIPE TRENCHES: — Excavations for pipe trenches, gulley traps, manholes, inspection chambers, valve, chamber, soakpits and septic tanks shall be to the

depth and gradients shown on the drawings using sight rails and boning rods and shall include for taking precautions against collapse of sides of excavations, staging, pumping and baling to keep the excavations free from water or mud and for filling in and ramming.

The bottoms of pipe trenches are to be excavated to even falls. The barrel of the pipe, except where it is laid on a sand or concrete bed, must rest on solid ground and hand-holds of sufficient size must be cut under pipe joints to enable the jointing and filleting to be properly performed. Any excavations taken out deeper than required shall be made up to the correct grade with well rammed earth. In intermediate or hard rock excavation and where a bedding is not specified, the trench bottom must be excavated 100mm deeper than required for the grade and be backfilled with well rammed earth.

The Contractor is to notify the Department when the trenches are ready for inspection and approval. Any work put in hand before approval has been given shall, if so required, be replaced with new at the Contractor's expense.

Notwithstanding such approval of the trench bottoms, any excavations which become waterlogged or otherwise spoilt after approval, shall be cleaned out and reformed at the Contractor's expense and to the satisfaction of the Department before any piping or sand or concrete beds are laid.

Depths of excavations as approved shall be checked and recorded by a Departmental Official and the Contractor before excavations are filled in.

For the purpose of any measurement, whatever size may have been excavated, excavations are taken as follows: — Trenches not exceeding 0.75mm deep shall be taken 0.5m wider than the internal diameter of the pipe. This width shall be increased by 75mm for each successive depth of 0,75m to a maximum of 1m wider than the internal diameter of the pipe.

BACKFILLING: — No trench shall be backfilled until the Department is satisfied that the works therein have been satisfactorily completed, tested and are ready for backfilling.

The backfilling around and 300mm above the pipe is to be of approved selected material, imported if necessary, free from rock or stone, carefully packed, watered and lightly rammed equally on either side of the pipe and then filled in above this level with suitable material from the excavations, watered and compacted in layers not exceeding 300mm thick with the top 300mm consolidated to dry density of not less than 95% MOD. A.A.S.H.O. density. Topsoil from the excavation is to be set aside and used in the final layer of backfilling.
Any disturbance of or damage to the pipes during backfilling must be made good by the contractor at his own expense.

All spoil from the excavations for trenches, etc. shall be deposited and levelled on site or carted away as directed. Any subsidence or depressions below the level of the adjacent ground shall be filled in, as and when necessary, until the end of the maintenance period.

SIZES OF PIPES: The diameters stated for galvanized mild steel piping, cast iron piping, vitrified clay piping and asbestos cement pressure piping (C.I.D.) are the nominal internal diameters. The diameters stated for all other pipes are nominal external diameters.

In the case of piping and fitting which are manufactured in imperial diameters, the size nearest the metric equivalent must be used.

RATES FOR PIPES: — Rates for all pipes, gutters, channels, etc. are to include for couplings in running lengths, joints, short lengths and cutting and fixing as required. Rates for mild -steel pipes shall include for all plain sockets and nipples. Where fittings have reduced ends or branches the fittings are described as "reduced" and the largest end or branch has been stated. The Contractor may use equal fittings with reducers or bushings if he so desires, but no claim for extras in this connection will be entertained.

Rates for pipes fixed to walls, soffits of slabs, roof timbers, etc. are to include for all

brackets, holderbats, pipe clips and approved extended hangers where pipes are required to be laid to falls and for plugging and screwing or for cutting and pinning or building in tails of holderbats.

Rates for piping are to include for cleaning down at completion, and in addition, the rate for stainless steel pining is to include for polishing exposed piping, all to the approval of the Department.

RATES FOR CHASES, HOLES ETC.: — are to include for making good to approval. The term "hole" is to include for sleeves where required through concrete work.

FIRE EXTINGUISHERS: — Where specified, carbon dioxide gas type fire extinguishers shall be 2.26kg type, complying with SANS Specification 889 and fixed in position on wall brackets screwed to and including 20mm thick chamfered and oiled wrot hardwood backboard, size 450mm x 100mm screwed to plugs in wall.

Where specified, dry powder type fire extinguishers shall be of 10 litre capacity, complying with SANS Specification 810 and fixed as before described on backboard size 1000mm x 200mm.

FIRE HOSE REELS: — shall be non-swinging rotary fire hose reels, complying with SANS Specification 543, with solid side discs and 25mm waterway at bracket incorporating rotary pressure joint to hose connection at hub and fitted with 25mm screwed malleable iron 'Sanders type A' valve with "S" grade diaphragm, connection for supply pipe with the handwheel clearly marked in red with arrows and the words "OPEN", "OOP".

The reel is to be secured to the wall with and including three steel anchor bolts and fitted with 30m length of 20mm internal diameter best quality reinforced red rubber non-kinkable hose with one end fixed to wheel hub connection and the other end fitted with 20mm chromium plated gunmetal adjustable "Centorium" type nozzle with hose threaded through and including chromium plated hose guide, designed to permit the hose to run out in any direction and the nozzle supported on and including chromium plated bracket fixed to wall.

For ease of removal, a union shall be installed between the valve and the reel.

FIRE HYDRANTS: — shall be of the wheel valve pattern with instantaneous coupling outlets, size 63.5mm or 70mm as stated on the drawings. Hydrants fixed in a horizontal position shall have oblique angle outlets and those fixed in a vertical or inclined position shall have right angle outlets. The materials used in the manufacture of the hydrants shall be as laid down for the manufacture of couplings, branch pipes, etc. in SANS Specification 1128, and the various requirements of instantaneous couplings and dimensions for 70mm outlets shall comply with the requirements for Morris instantaneous pattern couplings.
The valve spindle shall have a minimum diameter of 22mm with swivelling clack at one end fitted with first quality dexine or other approved washer, bedded on to a raised seat not less than 6mm wide, and the other end shall be machined to form a square shank of 15mm minimum thickness and a length corresponding with the thickness of the boss of the handwheel, the portion protruding from the boss shall be threaded and fitted with a washer and nut to hold the handwheel firmly in place. Valve inlet shall be male screwed 80mm Whitworth pipe thread, and outlet shall be fitted with approved India-rubber coupling gasket. The internal diameter of the valve body shall be not less than 95mm in the case of 63.5mm outlets or 100mm in the case of 70mm outlets.

The valve hand wheel shall have an overall diameter of 165mm and the rim shall be of oval cross-section and shall have the words "OPEN" and "OOP" together with direction arrows embossed on the face.

All hexagonal faces shall be machined and all exposed surfaces of the valve and the wheel periphery shall be buffed and polished. Parts of the wheel not polished shall be painted two coats bright red high gloss paint.

The completed hydrant valve shall be guaranteed hydraulically tested by the manufacture to a pressure of 35 bar and shall be badged or stamped accordingly with the manufacturer's

name or symbol and the words "TESTED 35 bar".

16. GLAZING

MATERIALS: — Glass shall conform to the requirements of the relevant current British Standards Specification for the respective materials.

Clear glass shall be float quality glass.

Silvered glass mirror to comply with SANS Specification 1236 Class A.

Toughened safety glass 15 to be "Armourplated" float quality safety glass of the thickness specified and as manufactured by Armourplate Safety Glass (Pty) Ltd. or other approved, and glazed to sashes, etc. in strict accordance with the manufacturer's instructions.

All toughened safety glass is to have the manufacturer's name or motif sand-blasted in one corner of each pane

Laminated safety glass is to be float quality normal strength glass, unless otherwise stated, and of the type specified and as manufactured by Shatterprufe Safety Glass Co. (Pty) Ltd., or other approved, and glazed to sashes, etc. in strict accordance with the manufacturer's instructions.

All laminated safety Glass is to have the manufacturer's name or motif sand-blasted in one corner of each pane.

All glass is to be free from imperfections and is to be left in a thoroughly clean condition on completion.

No glazing is permitted in Patient Treatment area's below 1 (one) meter.

GLAZING: — The glazing and fixing of glass in buildings shall be in accordance with SANS Code of practice 0317.

Glass panes shall have adequate glazing clearance between edges of glass and the rebates.

Putty for glazing shall comply with SANS Specification 680 type 1 for glazing in wood and type 2 for glazing in steel. Putty for glazing in natural finished wood shall be tinted to match the colour of the wood. Putty to be mixed with a hardener to allow for painting within +/- 3 days. Putty for glazing in aluminium windows shall be tinted to match the aluminium or anodised aluminium where required.
All rebates, other than those in natural finished hardwoods, are to be primed before glazing. Glass fixed with glazing beads shall be well bedded in back putty in the rebates.

Putty shall be carefully trimmed and cleaned off with front putty worked to within 3mm of the sight lines.

RATES: — Rates for glass generally shall include for preparing the rebates, etc. all putty, sprigs, clips, etc. as required and all cutting.

Rates for toughened and laminated glass shall include in addition for all necessary spacing and setting blocks in accordance with the manufacturer's requirements.

17. PAINTING

MATERIALS: — Proprietary materials where specified are to be of the brand specified or other approved by the Department.

All primers, emulsion paints, enamels, stains, varnishes, etc. are to comply with the relevant SANS Specification.

Paints, etc. shall be suitable for application on the surfaces to which they are being applied and those used externally shall be of exterior quality or suitable for exterior use.

For any particular work the priming coat and subsequent coats of paint are to be executed with paints from the same manufacturer and in accordance with that manufacturer's instructions.

The materials are to be brought to the site in unopened containers and no adulteration will be permitted, except thinners of a quantity and quality directed by the manufacturer.

The Department shall at all times be permitted to take samples for testing purposes from open containers of any brand of paint being used on the work.

All materials, if and when required by the Department, will be subject to tests by the South African Bureau of Standards, and the cost of such tests, should the material under test not meet the requirements of this specification, shall be borne by the Contractor. Fillers and stoppings are to be suitable for use with the material being filled or stopped and to the approval of the Department.

PREPARATORY WORK: — All new and existing surfaces are to be thoroughly dry and are to be cleaned of all dust, dirt, grease, oil, rust, scale, efflorescence, fungus, loose or flaking material, etc. rubbed down, stopped, filled, knotted and sanded smooth as required in accordance with the paint manufacturer's recommendations and to the approval of the Department prior to the application of paint, etc.

Ceilings are to have nail heads, including those to cornices and cover strips, primed and stopped up as necessary and rubbed down smooth.

Asbestos cement shall be primed with an approved alkali resistant primer before the application of subsequent coats which are not, in themselves, alkali resistant.

Iron, steel and other ferrous metals shall be cleaned in accordance with SANS Code of Practice 064 to remove rust, scale, grease, oil, etc. and the surface brought to a bright metallic condition.

Galvanized iron and zinc shall be cleaned in accordance with SANS Code of Practice 062 to remove the manufacturer's temporary protective coating, white rust, etc.

Other non-ferrous metals shall be thoroughly cleaned to remove all milling oils, temporary protective coatings, etc. and the surface abraded with fine water-paper and white spirit.

Woodwork to be painted shall have all knots and resinous areas treated with an approved knotting, the surface shall then be primed and all holes, etc. stopped and rubbed down smooth,

Woodwork to be oiled, stained, varnished, etc. shall be free of all stains, pencil marks and other surface discolorations and all holes, etc. stopped with tinted stopping and rubbed down smooth.

In preparing existing glazed sashes and sash doors, all loose putty is to be removed, the rebates primed and glass re-sprigged and re-puttied as necessary before the painting is commenced.

Previously distempered or lime washed surfaces to receive any other type of paint, are to have the existing distemper or lime wash completely removed by scraping or wire brushing and the surf aces treated with an approved bonding liquid.

Where existing paint film are in good condition any flaking or bared patches are to be properly feathered into the surrounding paint and spot primed as necessary.

Where existing paint films are in poor condition and require to be removed completely, they are to be removed by means of wire brushing, paint remover, burning off, or other approved method. Paint removers shall be free of wax and caustic substances and shall preferably be of water rinseable type. When burning off paint from wood, care must be taken to avoid charring the wood.

The final state of preparatory work to existing decorated surfaces shall in all cases produce in the finished decorated surfaces a condition similar to new work.

The Contractor will be held responsible for the proper and adequate preparation of the surfaces and any work which fails to meet the manufacturer's recommendations must be made good at the Contractor's expense to the satisfaction of the Department.

APPLICATION OF PAINTS, ETC.: — Painting may be carried out by brush, roller or spray as recommended by the manufacturer and to the approval of the Department. All paints, etc. are to be applied in strict accordance with the manufacturer's instructions. Each coat of paint is to be adequately and permanently keyed onto the previous coat or surface and shall be evenly distributed and continuous and shall dry to a smooth film, free from sags, runs or other imperfections. Each coat of paint is to be of a colour distinctive from previous or succeeding coats.

All painting must be done in accordance with a colour scheme which will be provided by the Department, and rates for painting etc. are to include for all cutting in of contrasting colours and masking as required. No distinction has been made where more than one colour of the same material is required on the walls or ceiling of the same room.

Samples of colours for the final coats are to be prepared in all cases to the approval of the Department and all work must be finished to the approved colours.

Backs of wood door and similar frames an the surfaces of other new or prefixed joinery in contact with brickwork, etc. and built in as the work proceeds, shall be primed or sealed before building in to prevent moisture seeping into the wood from the mortar bedding.

Tongued and grooved and rebated edges of boards in batten doors and other such like inaccessible parts of new joinery shall, before assembly, be primed, or where the joinery is to receive a finish other than paint, be given one coat of such other finishing material.

All new external structural timbers shall be primed before the timbers are fixed in position and shall include all surfaces such as backs of fascias and barge boards.

RATES: — Rates for painting, etc. are to include for all preparatory work, and where spraying is employed, are to include or adequately masking all surrounding areas.

Where diameters of pipes are stated these are the nominal internal diameters, and rates for painting pipes are to include for painting the holderbats, hangers, clips, etc. supporting the pipes.

Rates are to include for providing all necessary dust sheets, covers, etc. taking all necessary precautions to prevent marking the surfaces of joinery, walls, floors, glass, electrical fittings, etc. All surfaces disfigured or otherwise damaged shall be completely renovated or replaced as necessary to the approval of the Department at the Contractor's own expense.

18. ROADWORK

The Contractor is referred to the preambles for "Earthworks" with particular reference to the full description, intent and meaning of the classification for excavations and the preambles for "Concrete, Formwork and Reinforcement"

The construction of the roads is to be carried out by an approved Specialist Sub-Contractor in accordance with the following specifications and all to the approval of the Department.

SUB-GRADE: — All materials placed in the sub-grade layer which is defined as being the 150mm thick layer immediately below the sub-base or the base course (where no sub-base is specified), shall conform to the following specification: —

(a) Minimum C.B.R. at 93% Mod. A.A.S.H.O. density = 10 %

(b) Maximum C.B.R. Swell = 1.5 %

(c) Maximum Plasticity Index if:
more than 30% passes the 2mm sieve = 12
less than 30% passes the 2mm sieve = 16

The sub-grade layer in cut areas shall be treated in place either to achieve a uniform standard of compaction or to break up undesirable formations of hard rock.

In the case of materials other than hard rock, treatment in place shall consist of scarifying or otherwise loosening to a depth of 150mm and re-compacting to a density of 93 % Mod. A.A.S.H.O. where directed, with the material stabilised in place before compacting.

In hard rock, treatment in place shall consist of thoroughly loosening to a depth of 450mm by rip in or blasting and then sized by rolling or knapping until the maximum dimension of any spall shall be not more than 300mm.

Compaction of the rock in the sub-grade shall be achieved by spreading and sorting by bulldozer to a reasonable uniform thickness with sufficient fine material added to fill the voids and bind the surface.

Compaction shall be achieved by means of a vibratory roller until the Department is satisfied that the mass is sufficiently dense, to provide a stable sub-grade layer.

Density tests shall be carried out at the minimum rate of one test per every 500m^2 of sub-grade area or not more than 50m apart but not less than four tests for smaller areas and shall assess the full layer thickness. The costs of such control tests shall be included in the Contractor's rate for sub-grade treatment. The Department may; at its discretion, arrange for independent check tests to be performed, but the costs of the tests in this instance will be borne by the Administration.

Processing of the material will be measured under the relevant items. An approved total weed killer shall be applied during the formation of the sub-grade. The rate of application shall be in accordance with the manufacturer's specification.

Rates shall include for the supply, delivery, spreading and stabilisation with lime, if required, and compacting and shaping to correct lines and levels.

The lime and method of mixing and watering shall be as described in the specification for stabilisation.

SUB-BASE: — All material placed in the sub-base layer, which is defined as being that layer of 150mm thickness immediately below the base course layer, shall conform to the following specification: —

	Unstabilised	Stabilised
Minimum C.B.R. at 95 % Mod. A.A.S.H.O. density	70%	50%
Minimum C.B.R. Swell	0, 5%	0, 5%

Maximum Plasticity Index	10	10
Minimum Liquid Limit	35%	35%
Maximum size of aggregate	63mm	63mm
Material passing the No. 75 micrometer sieve shall not exceed	25 %	
Minimum relative compaction in place	95 % Mod. A.A.S.H.O.	

Combined coarse and fine sand density fractions shall exceed 35 % of the soil mortar

Unless otherwise specified, the responsibility for obtaining material that conforms to the above specification rests with the Contractor who will be required to perform his own tests to prove compliance, and to submit samples to the Department before the material is delivered on site. Further control tests will be required by the Department during the placing and compaction of the material, the locations of which will be selected at random.

Should the Contractor wish to use material from the site excavations, he shall first obtain the approval of the Department. His rates shall in this case include for the selection and stockpiling.

Density tests shall be carried out at the minimum rate as specified for the sub-grade layer.

The layer shall be finished off to present a uniform texture and tightly bonded surface.

Rates shall include for the supply, delivery, spreading and stabilisation with lime, if required, and compacting and shaping to correct lines and levels.

The lime and method of mixing and watering shall be as described in the specification for stabilisation.

The finished surface shall be within 20mm of the design level. The finished width shall not be less than the design width. The average of five thickness tests at the rate of one test for every 200m^2 of surface shall not be less than 150mm and at any point not less than 130mm.

The surface finish when measured under a 3m straight edge shall have no slacks or bumps greater than 5mm.

The cost of the density control tests shall be included in the Contractor's rate for sub-base construction. The Department, at his discretion, may arrange for independent check tests to be conducted, and the costs in these instances will be borne by the Administration.

STABILISATION: — The stabilisation agent shall be slaked lime of the calcium type conforming to the requirements of SANS Specification 824.

The rate of application shall conform to the design rate and all materials to be stabilised shall be approved by the Department before processing.

The material shall be spread in a uniformly thick loose layer over the full area and thoroughly dried by scarifying or blading with a grader to ensure exposure to the air of all particles and to ensure thorough mixing to obtain a uniform grading of the material.
When the material has been approved as being ready for stabilising it shall be lightly rolled to facilitate the spreading of the lime. The lime shall be evenly applied to the surface, preferably by mechanical spreader, at the specified rate and thoroughly mixed by rotavator or disc harrow until a uniform integrated mixture of uniform colour is obtained over the full depth of the layer.

Before mixing is commenced, the Contractor shall satisfy the Department that the lime has been applied at the specified rate.

Immediately after the lime has been mixed in, water shall be added in small increments by suitable watering equipment and mixed into the layer until the required water content has been obtained which shall not exceed the Mod. A.A.S.H.O. optimum plus 2%:

The efficiency of the spreading and mixing shall be measured by Lime Determination Test according to A.S.T.M.D. Test Number 3155/1973 or the California Test Method No. 338-B July 1996. Only where the result from every 15 tests at locations selected by the Department indicate that more than 90 % of the layer has a time content exceeding 60 % of the nominal lime content will the work be accepted, provided that the coefficient of variation shall not be greater than 25%.

The test positions shall be spaced at one for every 100m^2 of surface area, but shall not be spaced, greater than 20m apart

BASE COURSE: — When the sub-grade has been prepared and approved, the base course, consisting of one of the following, shall be formed to the compacted thickness specified.

Crusher Run Base Course
Crusher-run base course shall be fresh dolerite, hard blue tillite, quartzite, fresh granite, fresh basalt or other stone which meets the following specifications.

TABLE F: CRUSHER RUN BASE COURSE: STONE SPECIFICATIONS

Sieve Size	% Passing
37.5mm	100
26.5mm	82 - 95
19.1mm	70 - 85
13.2mm	58 - 75
4.75mm	34 - 55
Sieve Size	**% Passing**
2.00mm	22 - 40
0.425mm	10 - 25
0.075mm	5 - 12

Minimum C.B.R. @ 98% Mod. A.A.S.H.O. density		80%
Maximum C.B.R. Swell		0, 5 %
Maximum Liquid Limit		25
Maximum Plasticity Index		4
Maximum Linear Shrinkage	2	
Minimum Sand Equivalent Value		30
Maximum Flakiness Index	35	

The soundness of the aggregate shall be such that after 5 cycles using Magnesium

Sulphate it shall not show a loss of more than 15% by weight.
The maximum Aggregate Crushing Value should not exceed 30.
The moisture content used for field compaction shall not exceed the Mod. A.A.S.H.O. optimum plus 2 %.

Natural Ground Base Course

Natural ground base course shall be approved stone which meets either of the following specifications.
Natural Gravel (Unstabilised)

Minimum C.B.R. at 98% Mod. A.A.S.H.O.	80 %
Minimum C.B.R. Swell	0.5 %
Group Index value	0
Maximum Plasticity Index	4
Maximum Liquid Limit	35
Maximum Linear Shrinkage	2
Minimum Sand Equivalent Value	30
Maximum size of particle	53mm

Material passing No. 75 micrometer sieve shall not exceed 25 %

The combined coarse sand and coarse/fine sand fraction shall not exceed 35 % of the soil mortar

Natural Gravel (Stabilised with Lime)
Lime must comply with SANS Specification 824 Minimum C. B .R.

at 98% Mod. A.A.S.H.O. density,	160	140	120
provided that the minimum C.B.R. before stabilising, at 95 % Mod. A.A.S.H.O. density	30	45	60
Maximum C.B.R. S well			0, 5%
Maximum Plasticity Index	4		
Maximum particle size	2/3 layer thickness		
Maximum percentage passing No. 75 micrometer sieve	25		
Grading Modules	1, 5		

The responsibility for obtaining suitable base course material complying with the above rests with the Contractor, unless otherwise specified, and the provisions for sub-base material in regard to tests, etc. to prove compliance with the specification shall apply to the base course.

During construction, the base course shall be evenly distributed over the sub-grade. The stone shall then be rolled with a 4 to 5 tonne roller or equal unless otherwise instructed. After a few passes of the roller the surface shall be checked for shape camber and levels and all depressions filled in. Rolling and trimming shall continue until the surface is true to required levels and falls.

Minimum density in place after compaction shall be 98% Mod. A.A.S.H.O. density.

CHIP AND SPRAY SURFACING
Binders
One of the following may be used: —
M.C. 3000 Bitumen to SANS Specification 308 (150/200 Pen.)
M.C. 800 Bitumen to SANS Specification 308 (150/200 Pen.)

RTH 45 / 50 Tar to SANS Specification 748 Spray-grade 60% emulsion where approved or specified by the Department. If emulsion is used then the specified application rates shall be increased to give the required net bitumen content.

Cover Aggregate

All Cover aggregate used in the surface treatment shall be washed 13.2mm nominal sized crusher stone in accordance with SANS Specification 647.

Aggregate Crushing Value shall not exceed 15.

Binder shall be applied after the prime coat has dried completely and all tackiness has vanished.

The binder is to be applied by means of a distributor at a rate of 1.1 litre/m2 followed immediately afterwards by the spreading of a cover aggregate of 13.2mm stone at the rate of $125m^2$ / m^3. The aggregate is to be spread by means of an approved chip spreader; band spreading will only be permitted in those areas inaccessible to the spreader. The aggregate is to be rolled immediately with two passes of a pneumatic tyred roller. When the binder has set the surface shall be drag-broomed twice in each direction and then rolled again with four passes of the roller during the heat of the day or until the aggregate is firmly keyed into a tight surface.

DOUBLE SEAL COAT WITH BLACK TOP SURFACING: — The prime and first seal coat shall be applied as previously specified.

After the first seal coat has been drag-broomed and rolled as previously described, the binder shall be applied to the surface at a rate of 0.8 litre/in 2 followed immediately by the spreading of 6.7mm stone chips at the rate of $150m^2/m^3$. This stone aggregate shall then be drag-broomed and rolled as previously described.

A seal spray having a net bitumen content of 0.7 litre/in^2 shall then be applied to the surface when this coat has dried completely, and shall be rolled to firmly bed any loose aggregate.

If the surface is to be opened early to traffic, it shall be covered very lightly with sand or crusher dust distributed evenly with a hessian drag and back rolled with wet wheels before opening to traffic.

SLURRY SEAL SURFACING: — The aggregate for slurry seal shall conform to the following grading: —

Sieve Size (mm)	Percentage Passing
4, 75	100
2, 36	90—100
1, 18	65—95
0, 600	42—72
0, 300	23—48
0,150	10—27
0, 075	5—12

Slurry sand shall be crusher sand with a minimum sand equivalent of 35.

Binder — Stable grade emulsion (60%)
Anionic to SANS Specification 309
Cationic to SANS Specification 548

Consistency of the slurry shall consist of 90% crusher sand, cement filler not less than 1% and net binder content of not less than 9% by weight. Water to be added as required. As a guide, approximately 300 litres of emulsion and 160 litres of water are required per cubic metre of slurry.

The slurry shall be machine mixed and wherever possible applied by means of a spreader box. The rate of application shall be 170m^2/m^3. The slurry shall be of a creamy, homogeneous mixture, free of lumps, and if the mixture shows signs of breaking before application to the surface it shall be discarded.

After the first seal has been approved by the Department, but before the application of the slurry, a fog spray comprising of a solution of 1 part emulsion to 3 parts water shall be applied at a rate of 0.8 litre/m^2 to cover the aggregate. The application of the slurry may commence when the fog spray has been applied to assist with the spread of the slurry and to smooth out squeegee marks the slurry shall, immediately after being applied and before it has broken, be smoothed by a damp hessian drag either attached to the spreader box or pulled over by hand.

After the slurry has set it shall be covered by two passes of a pneumatic-tyred roller during the heat of the day.

The permissible variation in the application of the slurry shall not vary from the specified rate by more than 10%.

PREMIX TARMACADAM SURFACING

Prime Coat

When the base course is complete and dry it shall be cleaned of all loose material and be given a prime coat of one of the following primers: —
M.C. cut-back bitumen.
Tar Primer R.T.H. 3/P.
Emulsion Primer (60%).

The rate of application of the primer shall be within the range 0.65—1.0 litre/m^2, the actual rate to be determined by test and observation on site. Where emulsion primer is used, the application rate shall be increased to give the required nett bitumen content.

Hand spraying shall be used only in those areas inaccessible to mechanical distributors. Before spraying is commenced, the surface shall be lightly watered to settle dust.

Single Coat Premix Tarmacadam

When the prime coat has dried the single coat premix wearing course, of the compacted thickness specified, shall be constructed.

The wearing course shall be Type A (Hot Mix), unless otherwise specified or approved by the Department, and shall conform to the following specification: —

TABLE G: SINGLE COAT PRE-MIX WEARING COURSE: SPECIFICATIONS

	Screen Size mm	A Hot Mix	B Hot Mix	C (Kerbs)

Aggregate Grading Per Cent Passing	26.5 19.0 13.2 9.5 6.7 4.75 2.36 1.18 0.6 0.3 0.15 0.075	100 100 80 - 100 70 - 90 - 50 - 70 35 - 50 27 - 40 19 - 30 13 - 23 8 - 16 4 - 10	- - 100 80 - 95 60 - 75 45 - 60 28 - 42 18 - 30 7 - 20 2 - 10 0 - 5 0 - 4	- - - 100 90 - 100 65 - 75 52 - 62 50 - 60 45 - 55 30 - 40 9 - 19 4 - 8
Grade Binder		60 / 70	Emulsion	60 / 70
Nominal Nett Binder Content		5.5 % +/- 0.38	4.75 % +/- 0.3	5.5 % +/- 0.3

Penetration grades to comply with SANS Specification 307.

Cut-back bitumen to comply with SANS Specification 308.

Maximum heating temperature of bitumen 170^0C.

Delivery temperature at the paver for hot mixes 130—160°C.

For every 500m^2 of area paved the Contractor shall produce an extraction test result from a sample taken during laying operations showing grading and bitumen content of the premix carpet. The test as specified or any further tests to prove compliance with the specification shall be at the Contractor's expense.

In order that the stone and binder shall be properly mixed, this operation must be carried out in a pug-mill mixer or by hand with shovels and wheelbarrows or on metal plates, in which case the binder must be added in the correct proportions in small quantities. Mixing shall continue until the aggregate is uniformly coated with the binder. Bituminous surfacing shall not be carried out in rainy weather nor when atmospheric shade temperature is below 10^0C. Immediately after mixing, the surfacing materials must be spread and rolled on the same day. Spreading shall be done evenly over the base to ensure a consolidated thickness as specified and shall be performed by means of a mechanical spreader or by a drag spreader, or by hand, using rakes and screeds.

Where hand spreading is used, the premix must not be dumped on the base, but taken from the boards on barrows by shovel and then evenly distributed over the base. Hand raking must be reduced to a minimum to avoid segregation of aggregate. Rolling shall commence as soon as the binder has set sufficiently and, unless otherwise instructed, this shall be done with a 4 to 5 tonne roller or equal.

Places inaccessible to a roller may be compacted by means of 12kg tampers. The surface shall be rolled true to line and level without slacks or irregularities.

After three days the rolling shall be repeated during the hottest part of the day and a light application of fines may be added during the final rolling.

Premix Tarmacadam Kerb
Premix kerbs are to be Type C as specified above and constructed to give the following compacted size: —

Width at top	125mm
Width at base	230mm

Height	150mm

PRE-CAST CONCRETE PAVING BLOCKS: — shall be of the type, class and thickness specified, of approved colour and shall comply with SANS Specification 1058. Paving blocks which fail to meet these requirements must immediately be removed from the site and replaced at the Contractor's expense to the satisfaction of the Department.

Paving blocks shall be one of the following types as specified: —
Type S-A: — allows geometrical interlock between all vertical faces of adjacent blocks,
Type S-B: — allows geometrical interlock between some vertical faces of adjacent blocks.
Type S-C: — allows no geometrical interlock between vertical faces at adjacent blocks.

Paving blocks shall be one of the following classes as specified: —
Class 25: — average compression strength of at least 25 MPa.
Class 35: — average compression strength of at least 35 MPa.

Paving blocks are to be laid to approved patterns as specified and in accordance with the relevant clauses (excluding Clause 8) of SANS Specification 1200 MJ on and including a sand bed of the compacted thickness specified. After laying, the paving blocks are to be compacted by means of a vibrating plate compactor with the joints filled in, after compaction, by sweeping in jointing sand.

Sand for bedding shall conform to the following grading: —

Sieve size (mm)	Percentage Passing
9, 52	100
4, 75	95-100
2, 36	80-100
1, 18	50-85
0, 60	25-60
0, 30	10-30
0, 15	5-15
0,075	0-10

Sand for jointing shall pass a 1.18mm sieve and shall contain 10-50% of material that passes a 0,075mm sieve.

Spaces constituting less than 25% of a full block unit and of 25mm minimum dimension at perimeter edges of pavings against kerbs, buildings, inspection chambers, etc. are to be filled with Class B concrete trowelled to a smooth even surface to match paving blocks.

Rates for paving block pavings are to include for all straight cutting and waste, all half blocks at straight edges, filling with concrete as described, fitting, protecting from injury and cleaning down at completion.

KERBS

Generally

The kerbs are to be laid before the base course is commenced to the lines and positions as shown on the drawings. The Contractor is to allow sufficient time for the mortar bedding and joints to set and is to take all necessary precautions to maintain the line of the kerbs especially while rolling the base course and surfacing, as no claims in this connection will be considered.

Rates for kerbs are to include for necessary excavation, well consolidated bottom under kerbs and for filling and ramming to secure the kerbs in position.

Pre-cast Concrete Kerbs

Pre-cast concrete mountable kerbs as SANS Fig8 are to be of concrete Class 20 (20 MPa) and of the sizes described in the items, cast generally in 1m lengths, and finished smooth off the mould on top edge and both sides, with angles rounded, and rates are to include for all necessary formwork and moulds. The kerbs are to be bedded on and including a mat of

1:3 cement mortar, and the abutting ends of the kerbs are to be fully jointed in a similar mortar and pointed with a keyed-in joint on top edge and exposed sides.

Brick on edge kerbs
Brick on edge kerbs are to be of extra hard burnt bricks of the colour specified. The kerbs are to project 10mm above the finished tarmacadam level and are to be bedded on a mat of 1:4 cement mortar, and the abutting ends of bricks are to be fully jointed in a similar mortar and pointed with a keyed-in joint on top and exposed sides.

19. FENCING AND GATES

GENERALLY: — The Department shall be responsible for the initial location and exposure of all necessary boundary beacons and their indication to the Contractor at the site handover. The Contractor shall be responsible for subsequently ensuring that these beacons remain undisturbed and that the fencing is correctly aligned between boundary beacons. Should, during setting out of the further boundary beacons be uncovered or located and reasonable doubt arise regarding the correct alignment of fencing, then the Contractor shall be responsible for immediately notifying the Department, in writing, of such doubt, in order that the setting out may be checked and rectified, if necessary.

All bushes, trees, old fencing, rocks, debris, long grass and other obstructions shall be removed from the fencing line to produce a clear even strip 500mm wide on either side.

Trees, rocks or other items of horticultural or archaeological interest that are not to be removed will be indicated by the Department.

Straining Posts: - shall be erected at ends, corners and intermediately at not exceeding 30m centres with standards or intermediate posts erected between posts at not exceeding 3m centres.
Where fences are erected directly over boundaries, corner beacons shall be preserved by splaying the corner by planting two straining posts, each with one stay, 1 m from the beacon peg.
Security fences (i.e. fences with projecting overhangs if specified) shall be sited 350 mm back from the boundary line so that the end of the overhang is exactly on the boundary line.

SECURITY FENCING:

2.3m High security fencing shall consist of: -

1) Straining and Intermediate Posts (2.9mtr long).
2) Stays (2.6mtr long).
3) Welded mesh fencing (1.8mtr high).
4) Razor wire.
5) Concrete ground beam.
6) Tubular steel gate posts (when specified).

Straining and corner posts shall be 150mm ø x 3mm wall thickness steel tubing, in lengths as specified, with upper end capped and 3mm thick x 300mm x 300mm footplate welded to base. The whole shall be **hot dipped galvanized**. 80mm diameter stays x 3mm wall thickness shall be secured to posts with galvanised bolts. Straining posts to be positioned at maximum 30mtr c/c. Bottom of posts bedded in concrete to be painted with bitumen paint prior to erection. Where holes have to be drilled on site, drilling shall be cold galvanized before corrosion sets in.

Intermediate posts shall be 2.9mtr long x 100mm x 100mm square pre-stressed, precast concrete posts with top end splayed, spaced at maximum 3mtr apart. Stays for posts shall be prestressed reinforced concrete members of 75mm x 75mm x 2.6mtr long, splayed at the top end, with a 10mm ø x 50mm long galvanized steel pin attached to fit into a drilled hole in the upright and bonded to posts with approved epoxy.

Fence shall comprise of galvanized rectangular welded mesh fencing 1,80mtr high x 3.15mm ø x 25mm x 50mm rectangles fixed to 8 gauge or 3.15mm diameter – as

specified - hardened galvanized steel straining wires x 5, spaced vertically at 450mm ¢. Welded mesh shall be secured to straining wires with 2mm ø galvanized tying wire spaced at a maximum of 250mm between ties. Fencing overlap to be a minimum of 150mm.

Straining wires shall be fixed to posts with doubled strands of 2mm ø galvanized tying wire, pulled tight around posts and wound tightly around the straining wires.

Coils of 500mm ø galvanized flat wrap razor wire shall be fixed vertically above the welded mesh to a height of 450mm above the top of the welded mesh. Razor wire shall be supported on and fixed to three strands of galvanized double strand barbed wire. Barbed wire shall be fixed to the posts in the same manner as the straining wires.

Razor wire shall be fixed to the barbed wire at every intersection and laced to the concrete posts with galvanized tying wire.

A 250mm wide x 150mm minimum depth concrete ground beam of 15mpa strength shall be excavated for and cast along the entire length of the fence. Shuttering for the ground beam sides shall be provided as required. Finished level of the ground beam shall be 50mm above final ground level at the highest point, finished in a straight line both vertically and horizontally. 75mm of the welded mesh fencing and the bottom straining wire shall be embedded in this ground beam to secure the lower fence line. The top of the concrete beam shall be shaped to allow water to run off the top of the beam to prevent water collecting and standing on top of the beam.

At any change in direction of the fence line, two 150mm ø x 3mm wall thickness straining posts shall be erected with bottom ends embedded in a common concrete base with each post stayed separately.

Concrete bases for posts shall be Class B (1:3:5-19mm stone) size 400 x 400 x 500mm deep, unless otherwise specified, with tops of bases 100mm below ground level.

When required, gateposts shall be supplied in steel tubing complying with CKS 82, 150mm ø x 5mm wall thickness, in lengths as specified, with upper end capped with 1.6mm thick pressed mild steel domed cap welded on and 3mm thick x 300mm x 300mm footplate welded to base. Gateposts are to be drilled and fitted with mild steel ferrules welded into position to receive 20 mm ø mild steel hinges. Threaded 12 mm ø studs or approved stay collars are to be fixed on to the posts to locate and secure the top ends of stays. The whole shall be hot dipped galvanized. Where holes for the threading and fixing of straining wires are required, holes shall be drilled on site and cold galvanized on completion.
Stays shall have the top end flattened, bent as required, holed 12 mm ø for bolting to post and the whole hot dip galvanized.

Mild steel tubing for gate components shall comply with SANS Specification 657 Part 1. The diameters specified are the nominal external diameter of the tubing.

Straining wire: - shall be as specified, or either Type 1 galvanized wire of 3,15 mm diameter or Type 2 PVC coated galvanised wire with 3, 15 mm diameter core wire PVC coated to an overall diameter of 3,95 mm. Stainless steel straining wire when specified shall be 2,50 mm diameter A.I.S.I. Type 304 stainless steel, strained between posts and tied to same at terminal ends by turning each wire twice around the post and tying off by twisting it a minimum of three turns around the strained wire.

Binding or Tying wire: - shall be as specified, either Type 1 galvanised wire of 2 mm diameter or Type 2 PVC coated galvanised wire with 2 mm diameter core wire PVC coated to an overall diameter of 2, 80 mm.

Galvanized barbed fencing wire: - shall consist of two strands of 1, 60 mm diameter high tensile steel wire twisted together with barbs at 125 mm centres and each row of barbed wire shall be strained between posts and tied to same at ends by turning each wire around the post and tying off by twisting it a minimum of three turns around the strained wire.

Galvanising: - shall comply with SANS Specification 763 and all items of posts, stays, gate

framing, etc., described as galvanised shall be hot dipped galvanised after fabrication with Class A galvanising with all internal and external surfaces fully coated.

GATES: — Generally single gates and double gates shall be of the sizes stated and formed with mild steel tubular framing all round, covered with chain link wire mesh of the type specified laced to framing. Tubular framing to gates shall be mitred and welded at corners and, at all other intersections, the tubular framing shall be scribed and welded together with all welds ground smooth.

Preferred gate hinges are Bullet Type or through pin type hinges.

Where gates are to be hung on precast concrete posts, hinges shall be fixed to and including mild steel clamps, each formed of two 50 x 5 mm mild steel plates 200 mm long, twice holed for and bolted on opposite sides of post with two 10 mm ø x 140 mm galvanized mild steel hex-head bolts and with each plate holed to receive 20 mm ø gate hinge.

Each single gate and one leaf of each double gate shall be fitted with gate latch formed of 25 x 6 mm mild steel bracket, 550 mm girth, twice bent to U-shape with centre section 150 mm high and with ends scribed and welded to tubular stile of gate. A locking bar formed of 25 x 6 mm mild steel plate, 100 mm long, twice holed 13 mm diameter for shackle of padlock and for pad bolt, shall be welded to inside of bracket. The sliding pad bolt shall be formed of 12 mm ø mild steel rod, 220 mm long, with 25 x 6 mm mild steel flat bar 60 mm long welded on at one end and holed 13 mm diameter for shackle of padlock. The stile of the gate and the locking post or locking stile of the double gate shall be holed for and fitted with mild steel ferrule welded in to receive pad bolt. In addition, fittings to each leaf of double gate shall comprise 50 x 6 mm mild steel locking bar, 80 mm long, holed 20 mm ø for shackle of padlock and welded to locking stile of gate and drop bolt formed of 16 mm diameter mild steel rod, 575 mm girth, once bent to L-shape, fitted through and including 20 mm internal diameter mild steel sleeve welded to gate at bottom corner, with 12 mm diameter mild steel peg stay 25 mm long welded on to gate frame.

A concrete gate stop block size 230 x 230 x 230 mm deep with two 20 mm internal diameter mild steel sockets, each 75 mm long, cast into top shall be embedded in the road surface between each pair of double gates in the closed position. A similar gate stop block but with one socket shall be embedded in the road surface to each leaf of double gate in the open position.

Each single or double gate shall be fitted with an approved 51 mm brass padlock with hardened steel shackle and two keys.

Gates for 1, 20 m high fencing

Single gates shall be size 1,00 x 1,20 m high, each hung on hinges as stated above and formed of 32 mm diameter x 2 mm wall thickness mild steel tubular framing all round. Each gate shall be fitted with locking pad bolt with brass padlock.

Double gates shall be in two equal leaves with each leaf size 2.25 x 1, 20 m high, hung on hinges as stated above, formed of 38 mm diameter x 2 mm wall thickness mild steel tubular framing all round with two 38 mm diameter x 2 mm wall thickness mild steel tubular braces welded on between bottom corners and centre of top rail of each leaf. Each pair of double gates shall be fitted with locking pad-bolt, locking bars with brass padlock, drop bolts and concrete gate stop blocks as specified above.

Gates for 1, 50 m high fencing

Single gates shall be size 1, 00 x 1, 50 m high as described for gates for 1, 20 m high fencing but with each stile of gate extended 330 mm above top rail and braced between top rail and top of extension arm with 32 mm diameter x 2 mm wall thickness mild steel diagonal brace welded on and hung on hinges as stated above. Two rows of galvanised barbed wire, spaced 150 mm apart, shall be strained and tied to the extension arms.

Double gates shall be in two equal leaves with each leaf size 2, 25 x 1.50 m high with each hung on hinges as stated above, all as described for double gates for 1, 20 m high fencing but with each stile of each leaf extended 3 mm above top rail and braced between top rail and top of extension arm with 38 mm diameter x 2 mm wall thickness mild steel diagonal brace welded on. A vertical extension arm 330 mm high - formed of 38 mm diameter x 2 mm wall thickness mild steel tube - shall be welded on above centre of top rail. Two rows of galvanised barbed wire, spaced 150 mm apart, shall be strained and tied to extension arms.

Gates for 3, 00 m high fencing
Single gates shall be size 1,00 x 1,50 m high, hung on hinges as stated above and formed of 38 mm diameter x 2 mm wall thickness mild steel tubular framing all round with 38 mm diameter x 2 mm wall thickness mild steel horizontal centre rail. Each gate shall be fitted with locking pad bolt with brass padlock.
Chain link wire mesh fencing shall be carried over and above the top of the gate as previously described for fencing.
Double gates shall be in two equal leaves with each leaf size 2, 25.x 3, 00 m high, each hung each hung on hinges as stated above, and formed of 51 mm diameter x 2 mm wall thickness mild steel tubular framing all round with two 51 mm diameter x 2 mm wall thickness mild steel tubular braces welded on between bottom corners and centre of top rail of each leaf. Each pair of double gates shall be fitted with locking pad bolt, locking bars with brass padlock, drop bolts and gate stop blocks.

Gates for 1, 8 m high security fencing:
Single gates shall be size 1,00 x 1,80 m high, hung on hinges as stated above and formed of 38 mm diameter x 2 mm wall thickness mild steel tubular framing all round with 38 mm diameter x 2 mm wall thickness mild steel horizontal centre rail. Each gate shall be fitted with locking pad bolt with brass padlock.
Single gates shall be hung on mild steel tubular gate posts with cranked overhang when specified and the galvanised barbed wire overhang shall be carried over above the gate as previously described.
Double gates shall be in two equal leaves with each leaf size 2, 25 x 1, 80 m high, each hung on hinges as stated above and formed of 51 mm diameter x 2 mm wall thickness mild steel tubular framing all round with two 51 mm diameter x 2 mm wall thickness mild steel tubular braces welded on between bottom corners and centre of top rail of each leaf. The stiles of each gate shall be extended 450 mm high above the top rail and braced between top rail and top of extension arm with 51 mm diameter x 2 mm wall thickness mild steel diagonal brace welded on. A vertical extension arm 450 mm high formed of 51 mm diameter x 2 mm wall thickness mild steel tube shall be welded on above centre of top rail. Three rows of galvanised barbed wire, spaced 150 mm apart, shall be strained and tied to extension arm. Each pair of double gates shall be fitted with locking pad bolt, locking bars with brass padlock, drop bolts and gate stop blocks.
Double gates shall be hung on posts without cranked overhang but with the posts extended 450 mm high above top of chain link wire mesh fencing to receive continuation of barbed wire and razor wire.

Gates for 2, 40 m high security fencing
Single gates shall be of size 1, 00 x 2, 00 m high, all as described for gates for 1, 80 m high security fencing.
Chain link wire mesh fencing shall be carried over above the top of the gate to an overall height of 2, 40 m with the razor wire carried across between the gateposts.
Double sates shall be in two equal leaves, with each leaf 2, 25 x 2, 40 m high, all as described for double gates in 1, 80 m high security fencing.
Double gates shall be hung on posts without cranked overhang but with the posts extended 450 mm high above top of chain link wire mesh fencing to receive continuation of razor wire.

SUBMISSIONS FOR PREFABRICATED TIMBER ROOF TRUSSES

Letter Ref. TR 1

I / We hereby undertake to be responsible for the design of the total timber roof construction and will satisfy myself / ourselves that the fabrication and erection is in accordance with my / our design.

Project: _____

_____

Part(s):

_____

_____

NAME OF FIRM:

_____

SIGNATURE: _____ QUALIFICATION:

_____

DATE: _____

Letter Ref. TR 2

I / We am/are satisfied that the fabrication and erection of the total roof construction has been completed in conformity with my / our design.

Project: _____

_____

Part(s):

_____

_____

NAME OF FIRM:

_____

SIGNATURE: _____ QUALIFICATION:

_____

DATE: _____

SUPPLEMENTARY PREAMBLES

The following Supplementary Preambles are to be read in conjunction with the "Standard Preambles to all Trades" included here before and are to apply to this Contract.

Where these "Supplementary Preambles" are at variance with the "Standard Preambles to all Trades" referred to above, such variances are to take precedence and are to apply to this Contract.

1. ALTERATIONS

All Notes, Preambles, etc. applicable for the various trades in the Bills of Quantities, will apply equally to the trades in this Bill.
Tenderers are advised to visit the site and satisfy themselves as to the nature and extent of the work to be done, and also to examine the condition of the existing building.

Tenderers are advised that all materials from the pulling down (except where described to be re-used or handed over to the Department) will become the property of the Contractor, and all these materials, together with all rubbish and debris, must be immediately carted away, and the site left clean and unencumbered. Materials, etc. which are described to be handed over to the Department are to be carefully dismantled where necessary, and neatly stacked where directed on site. Items described as removed shall be removed from site.

Credit for the value of the materials from the pulling down may be allowed for on the Final Summary page.

Prior to the removal of any timbers from the site, they are to be inspected by the Government Entomologist as laid down in Section 32 of the Government Forest and Veld Conservation Act of 1941 (Act 13 of 1941) as amended. If any of the timbers are infested with wood destroying agencies, they are to be disposed of in the manner prescribed by the Government Entomologist.

The Contractor is to give ample notice to the Department and Local Authorities regarding any disconnections necessary prior to the removal or interruption of electric light or telephone cables, water and sanitary services, etc.

Tenderers are advised that adjacent sections of this building will be occupied during the building operations, and the Contractor is required to carry out the work with as little noise, dust and disturbance as possible. Undisturbed access is to be given to patients, staff and visitors.

The Contractor is advised to check all dimensions affecting the existing building as he will be held solely responsible for all new work being of the correct size. All sizes stated are approximate and under no circumstances will claims be entertained should actual sizes of existing items on site vary marginally from the sizes stated in this document.

The Contractor will be held solely responsible for any damage to persons, property, and equipment and for the safety of the structure throughout the whole of the Contract, and must make good at his own expense any damage that may occur.

The Contractor must obey the instructions of the Department in carrying out any portion of the work which in his opinion requires expediting, and the Contractor shall give priority to such work as and when directed.

In taking down and removing existing work, the utmost care is to be observed to avoid any structural or other damage to the remaining portions of the building. The Contractor must also protect all work not removed, such as walls, floors, doors, windows or joinery, loose and fixed fittings and electrical equipment, appliances, etc. from damage during the progress on the works and provide all necessary materials in so doing.

Special care is to be taken not to interfere with any electric light, bell, power or telephone wires and fittings that may be encountered on site. New work to the existing electrical, air-conditioning, gas and telephone installations, etc. is included elsewhere in this document.

The Contractor must take the exigencies of the Hospital Service into consideration. Liaison is to be carried out through the offices of the Regional Engineer, with referrals to the Director: Physical Facilities Management for a final decision. No instructions may be received by the Contractor from the Hospital Authorities and all instructions are to be given by the Chief Department in writing before they are put in hand.

2. CONCRETE, FORM WORK AND REINFORCEMENT

Cement is to comply with:

SANS ENV 197 (1 to 2)
SANS ENV 413 (1 to 2)
SANS ENV 196 (1 to 7)
SANS ENV 196 (21)

as applicable, and replaces the following SANS Specifications in the Standard Preambles:

SANS 471 Portland cement (ordinary, rapid hardening and sulphate resisting)
SANS 626 Portland blast furnace cement.
SANS 831 Portland cement 15 (ordinary and rapid hardening)

3. MASONRY

Masonry is to comply with SANS Code of Practice 0249 and 0164 as applicable.

4. ROOF COVERINGS, ETC.

The installation of roof coverings and side claddings is to comply with SANS Code of Practice 0237 as applicable.

5. CARPENTRY AND JOINERY

Note:

All timber must be treated in terms of SANS Code of Practice 05 for GYMNOSPERMAE including all SA Pine species and ANGIOSPERMAE including all Eucalyptus species but excluding laminated timber.

It is now a compulsory requirement to use only treated timber in buildings. The treatment shall comply with SANS 457, 753, 754 or 1288 as relevant.

Reference must also be made to the appropriate Standard Preambles and SANS requirements for items not covered by these joinery preambles, etc. i.e. ironmongery, aluminium, glazing, paintwork, etc.

Where items are described as "plugged and screwed", they are to include for plugging and screwing to new or existing brickwork or concrete, with heads of screws sunk and pelleted.

Sawn softwood timber: General, Stress Graded, Industrial, Brandering and Battens is to comply with SANS 1783 Parts 1 to 4 as applicable.

All hardwood is to be dark red Meranti, even in grain and colour selected for "Standard and Better" quality, from Malaysia, with a minimum density of 550 kg per cubic metre at moisture content of 12%, and is to comply with SANS 1099 as applicable.

Hardboard is, unless otherwise described; to be 3mm un-tempered hardboard for floor units and 6mm tempered hardboard for wall units.

Melamine faced moisture resistant V313 chipboard can be used when specified.

Materials generally are to comply with the following specifications and requirements as applicable:

TABLE H: CARPENTRY AND JOINERY: SANS SPECIFICATIONS

MATERIAL	SANS SPECIFICATION	GRADE OR CLASS
Softwood structural timber	1783	Parts 1, 2, 3, 4
Softwood engineering timber	1783	Parts 1, 2, 3, 4
Softwood studs for timber frames in building	1783	Parts 1, 2, 3, 4
Softwood brandering and battens	1783	Parts 1, 2, 3, 4
Softwood joinery timber	1783	Parts 1, 2, 3, 4
Softwood flooring boards	629	Flooring Grade
Hardwood joinery timber	1099	Heavy flooring board
Hardwood strip flooring	281	Knotty grade
Wooden ceiling and panelling boards	1039	As specified
Laminated timber (glulam)	1460	As specified
Gypsum, plasterboard	266	As specified
Wood fibreboard	540	As specified
Wood wool panels (cement bonded)	637	As specified
Fibre cement sheets: profiled and flat	685	As specified
Fibre cement boards	803	As specified
Plywood and composite board Particle Board: Highly Moisture resistant exterior and flooring type Interior Type	929 EN 312 EN 312	 Parts 1 to 7
Decorative laminates	SANS ISO 4586 and SANS 1405	High Pressure
Decorative Melamine Faced Boards	1763	
Wooden Doors (flush)	545	
Materials for thermal insulation of buildings	1381	As applicable
Mild steel nails	820	
Metal screws for wood	1171	
Creosote	538	As specified
Timber roof trusses	0243	SANS Code of Practice

6. CEILINGS AND PARTITIONS

Refer to Joinery Fittings regarding specifications and requirements of materials.

7. IRONMONGERY

Materials

i) Locks are to comply with SANS 4 as applicable
ii) Door closers are to comply with SANS 1510 as applicable
iii) Symbolic safety signs are to comply with SANS 1186 as applicable

All ironmongery, unless otherwise described, is fixed to timber.

Sheet steel furniture to comply with SANS 757 as applicable

8. METALWORK

Rates are to include for cutting to lengths, splay cut ends, shaping, holing, tapping, threading, forging, turning, fitting, assembling, welding, filing smooth, preparation, priming coats, hoisting, temporary bracing and fixing in position.

Towel rails are to be tubular Satin Chrome mild steel to diameters - minimum 19mm - and lengths as specified in matched Satin Chrome end pieces. End pieces to be either flat or bracket type - according to requirements, application and specification - plugged and screwed into walls with Chromed Brass screws.

Electro-plating is to comply with SANS ISO 1456 as applicable.

Curtain tracks to be "Forwin" Hospital Curtain Tracks as "Kirton" (Pty) Ltd. - or other approved -, including 15 wheeled runners per metre, hangers, brackets, stopped ends, etc. Hangers are to be suspended from roof timbers or concrete slab over – **not off the ceiling grid**. Allowance is to be made for necessary bends and curving as per plan supplied. Curtains to be provided as (Chintz fabric (#155CZ) woven with 100% polyester yarn)

SHELVING FOR PHARMACIES: - Shall be epoxy coated steel shelving, either fixed to epoxy coated wall bands or free standing units as specified.

SHELVING FOR CSSD STERILE STORE: - Shall be slatted grade 304 stainless steel wall bands or free standing units as specified.

Aluminium Windows and Doors

NOTE:

Glazed aluminium alloy windows and sliding doors for external use are to comply with SANS 1651 as applicable.

All items must conform to and carry the Certification Seal of the AAAMSA and no items which are not so certified will be accepted on site.

The work is to be cleated and framed.

All visible surfaces are to have a 25 micron anodised finish as specified.

Anodised coatings on aluminium are to comply with SANS 999 as applicable.

Rates are to include for setting up and building in as well as for isolation material between the aluminium surfaces and adjacent surfaces of a differing material.

All visible surfaces are to be covered with a temporary protective tape, later to be removed.

Float glass for glazing is to comply with SANS CKS 55 and SANS 952 as applicable.

Safety and security glazing materials for buildings is to comply with SANS 1263(1) unless otherwise described. All panes are to be marked so as to be visible. Laminated safety glass is to carry a written five year guarantee.

Windows and doors are to be watertight.

Silicon pointing to windows and doors is covered elsewhere.

9. PLASTERING

Rates for new plaster, screeds, etc. to existing surfaces are to include for all preparatory work and forming a key.

Removal of paint and/or varnish as well as the roughening of the existing face brick surfaces both externally and internally to receive new plaster has been measured separately.

Plaster and screeds, etc. in patches is generally of an isolated nature and to existing surfaces. Portion of the work may be in narrow widths.
Where alterations are to be done to the existing structure, the new plaster, etc. has been measured to a point 300mm beyond the line of the alteration on the existing structure.

10. TILING

Ceramic Wall and Floor Tiles are to comply with SANS 1449 as applicable.

11. PLUMBING AND DRAINAGE

Water Supply and Drainage for Buildings is to comply with SANS Code of Practice 0252 as applicable.

Water Supply and Distribution System Components is to comply with SANS 1808 as applicable.

Electrical Water Heater:

Storage Heaters to comply with SANS 151.
Instantaneous Heaters to comply with SANS 1356 and IEC 335 (2-35).

12. GLAZING

Glass is to comply with SANS Specification 952.

Glass for glazing is to comply with SANS Specification CKS 55.

Safety and security materials are to comply with SANS Specification 1263 as specified.

Laminated safety glass is to carry a written five year guarantee.

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 2

GENERAL ELECTRICAL SPECIFICATIONS

GENERAL ELECTRICAL SPECIFICATION

(ALL IN CONTRACTS)

1. CONDUIT AND CONDUIT ACCESSORIES

1.1 Conduit

Conduit shall be of steel galvanised internally and externally, either solid drawn, or welded and not less than 20 mm diameter, with all rough edges removed. All tube ends removed. All tube ends are to be reamed. With screwed conduit one threaded end is to be fitted with a coupling and the other end is to be protected against damage.

UPVC conduit may only be used if permitted by the Head : Works and only in those areas which he may specify. In this case this conduit shall be according to SABS 950.

Conduit accessories, which are secured to the conduit by means of lugs, screws or setscrews, are not acceptable.

General requirements of conduiting to SABS IEC 60614 (1).

Metal conduits shall be fully in accordance with SABS 1065 PART I.

1.2 Conduit Accessories

All conduit accessories shall be galvanised both internally and externally and comply with SABS 1065 – PART II.

All screwed conduit fittings shall be of malleable cast iron.

Where fittings are fitted with covers, the covers shall be of galvanised pressed steel secured with brass screws.

1.3 Flexible Conduit

Flexible conduit shall be of the plastic covered metal type complete with brass connectors to the approval of the Head : Works.

2. INSTALLATION OF CONDUIT

2.1 General

Except where cables are specified for certain circuits, the installation(s) shall be tubed throughout in steel conduit. Split conduit is not permitted. All conduits shall, wherever possible, or unless otherwise specified or agreed, be concealed in the structural work.

Except where agreed or otherwise specified or indicated on the drawings, all conduit to points shall run via the ceiling and floor slabs or roof space. In damp situations and where exposed to the weather, the conduits shall be so installed as to avoid, as far as possible, the condensation of moisture within them. All running joints are to be painted with an approved metal primer.

Mechanical and Electrical continuity must be maintained throughout the installation. Each length of conduit and every conduit fitting must be inspected for defects and all sharp edges or burrs must be removed before it is installed. All joints are to be tightly fitted together.

Running joints with long threads, where used, are to be fitted with a lock nut and the running thread shall not be longer in length than a coupling and lock unit.

In conduits smaller than 32 mm elbows and normal bends are not to be used but conduits are to be set to the required angles.

Flexible connections between conduit and appliance or other equipment shall be by means of flexible tubing (see Par 1.3).

No wiring shall be drawn into conduits until the conduits have been installed.

Where more than one socket outlet is connected on a circuit, the conduit shall be looped from the one outlet box to the following outlet box.

All switch-boxes, socket outlet boxes and any other purpose made metal box including distribution board trays shall be suitable treated against corrosion before installation with "Rustodian" or other approved metal primer.

All conduits shall be securely fixed into chases, and all flush switch and socket outlet boxes must be firmly embedded in cement mortar.

The Contractor shall make himself familiar with the positions of all fittings, such as blackboards, pinning boards, cupboards, shelving, worktops, etc, before commencing the conduit installation. The position of switches and socket outlets as indicated on the drawings are approximate only. The Contractor must verify that the final position of these will not be covered by the installation of the fittings referred to above, or come midway between the junction of any dados and upper wall finishes.

No extras will be entertained for moving switches or socket outlets as a result of the Contractor's failure to verify the final positions of the fittings or type of wall finish.

2.2 In Roof Spaces

The conduit in roof spaces shall be installed parallel or at right angles to the roof truss members and shall be secured at centers not exceeding 1,2 m by means of galvanised saddles nailed to the timbers with galvanised clout nails. Crampets will not be allowed.

Crossing of conduits is to be avoided wherever possible. Where unavoidable, one conduit must be neatly set over the other. Where a number of conduits have to run back to the distribution board or switchboard, they shall run parallel to the distribution board or switchboard, and at saddle distance to each other wherever possible.

Conduit runs from distribution boards shall terminate in fabricated sheet steel draw boxes installed in the roof above the distribution boards. Each draw box shall be fabricated from 1,6 mm galvanised sheet steel with welded corners and

suitably treated against corrosion with "Rustodian" or other approved primer and finished in aluminium paint.

Each draw box is to be fitted with slip-on lid with a 13 mm skirt. The box shall be 75 mm deep, shall be rectangular in shape and the size of conduits entering or leaving the box. Conduits shall be fixed to the box by means of couplings and brass male bushes or lock nuts and brass bush-nuts.

Conduit droppers shall be neatly cut into timber wall plates and set to face the right direction. All sets must be uniform. Conduits may be set at angles only where droppers or ceiling points are within 230 mm of roof members.

No conduits are to be run over the top of gangplanks or trapdoors.

Draw-in boxes with metal covers shall be provided where required and shall be installed near the gangplanks, if any. All inspection conduit fittings in open roof spaces shall face upwards to facilitate wiring and to permit easy inspection. Three-way conduit boxes shall be used for tee-off purposed in open roof spaces. Inspection tees are not to be used except where otherwise agreed or specified.

All conduits extended into a roof space with a roof clearance of more than 900 mm shall be set onto the beam and extended into the roof for a distance where there is sufficient clearance. Under flat roofs or where there is less than 900 mm clearance, the conduit shall be installed as specified for tubing in concrete slabs, right angle bends should be kept to a minimum and the shortest route taken.

Where false ceilings occur they shall be tubed as called for in the detailed specification. Conduits in restricted spaces and run as for concrete slabs must however, be installed in a neat and orderly manner.

Conduits to ceiling points for all types of fittings must be firmly supported and shall terminate in a back entry conduit box. The conduit box shall be taken through to the face of the ceiling and finish flush. Where the ceiling brandering interferes with the installation of the ceiling point specified, the Contractor must trim the brandering to allow the conduit box to be taken through to the face of the ceiling as specified. Luminaires must be bonded to the conduit box by means of metal threaded screws.

2.3 **In Concrete Slabs**

In order not to delay building operations, the Contractor must ensure that all conduits and conduit fittings, which are to be cast in concrete, are laid in good time. The Contractor shall have a competent Electrical Artisan standing by during casting of concrete, etc, to ensure that the conduit boxes are not damaged during casting of concrete.

Draw boxes, expansion joints boxes and round conduit boxes are to be provided where necessary.

Deep type conduit boxes shall be used for side entering conduits and normal shallow boxes may be used for back entry conduits. No elbows, bends or sharp sets will be allowed in concrete slabs except in cases of conduits of 40 mm diameter or when larger sweeping bends will be permitted.

Common drawn and/or inspection boxes shall be used where there is more than one circuit involved. They shall be installed in lavatories, storerooms, or other inconspicuous places. Covers shall be of hardboard neatly finished to match the finished ceiling or wall surface, and shall be fitted parallel to the wall or ceiling.

All boxes, etc. are to be securely fixed to the shuttering to prevent displacement when concrete is cast. All conduits must be laid off the deck, supported and secured at regular intervals and installed as close as possible to the neutral axis of concrete beams and slabs.

Expansion joints shall be shown on layout drawings and shall consist of a metal box in which one conduit is fixed and the other capable of movement with the building's expansion and contraction. Earth continuity of these joints shall be maintained by means of stranded copper conductors bonded to the conduits in the box as shown on the drawing.

Earth conductors and clamps buried in concrete are not permitted.

Conduits must be spaced sufficiently apart to allow for proper concreting. All joints shall be painted with an approved metal primer after completion of the tubing installation, prior to the concreting. All exposed parts of the conduit installation shall be suitably, protected against corrosion at the discretion of the Head : Works.

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

2.4 Surface Work

All conduit must be plumbed and leveled and only straight lengths shall be used.

In cases where doorframes are out of plumb, or fittings, beams etc, are out of level, the conduit shall be run parallel with the doorframes, fittings, beams etc.

No threads shall be visible when the conduit installation is complete, except on running couplings.

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

No inspection or normal bends are to be used on surface work, except with the approval of the Works Inspector and where conduits of 32 mm diameter or larger are used. Conduits shall be set uniformly and inspection couplings shall be used where necessary.

Fittings, tees, boxes, couplings, etc, are to be cut into the surface to allow the conduit to fit flush against the surface or alternatively spacer bar saddles may be used. Conduit is to be bedded into any irregularities to avoid gaps between the surface and the conduit.

Double sets, where used, shall be parallel with no twists and shall be as short as possible. All conduits, which terminate at metal trays, boxes, industrial switches and plugs shall do so by means of couplings and male bushes. No couplings will be permitted in droppers of lengths less than 3.6 m.

Where crossings of conduits is unavoidable, purpose made metal boxes shall be used. The length of the box is to be 8 times the diameter of the largest conduit, the width one and half times the sum of the diameter of al the conduits, and the depth one and half times the diameter of the largest conduit with a minimum depth of 50 mm. The box shall be fitted with a neatly fitting cover and the finish shall be in keeping with the general layout.

Where a number of conduits are to be installed in parallel they shall be evenly spaced and grouped under one purpose made saddle. Conduit spacing shall not exceed 10 mm. The purpose made saddle shall be made of 25 x 2 mm galvanised steel strip or other approved material, formed to suit the curvature of the various conduits and shall be drilled and fixed by means of screws between. Saddles shall be spaced at intervals not exceeding 1.8 m, except for conduit droppers, which shall be saddled centrally between ceiling and accessory box. All saddles are to be secured to the wall by means of black japan or brass rounded head screws. Distribution boards, draw boxes, industrial switches and plugs, etc, shall be neatly recessed into the surface of plastered walls to avoid double sets or alternatively spacer bar saddles may be used. On face brick walls the conduit shall be tightly set into the switch or plug.

In situations where there are not ceilings, the conduits are to be run along the wall plates and tie beams.

No wiring is to be carried out until the tubing has been inspected and approved.

Where spacer bar saddles are used, these shall be installed at centers of 1 m for horizontal and 1.5 m for vertical runs.

All conduits shall be painted with an approved enamel paint to match the background colour.

2.5 Future Extensions

In roof spaces with a minimum clearance of 900 mm, switch and plug drips for future use are to be set 300 mm in the correct direction and shall be threaded and fitted with plugged couplings. Where the roof over a slab is to be removed for future expansions, conduits for future use are to terminate 40 mm above tie beams and shall be threaded and fitted with plugged couplings.

Where future extensions are to be below slabs, all switch, socket outlet and other conduit droppers are to terminate 130 mm below slabs or beams with conduit ends threaded and fitted with plugged couplings.

Where provision is made for future extensions to a concrete slab, all conduits required for future use are to project 130 mm from the slab. Conduit projections are to be painted with an approved anti-corrosive paint and must be fitted with plugged couplings.

All switch, plug and other outlet boxes required for future use shall be fitted with approved blank cover plates.

Unused lighting outlet boxes are to be fitted with round hardboard or plastic covers with brass cover screws, which shall fit flat on the finished ceiling.

2.6 **Fixing of Conduits**

Conduits shall be fixed to switch and socket outlet boxes by means of couplings and brass male bushes or lock nuts and brass bush nuts. Couplings and male bushes to be used on all surface work.

2.7 **Chases and Building Work**

Except where otherwise specified conduits, switch boxes, plug boxes and distribution boards are to be built into the brick walls by the Contractor. It will, however, remain the responsibility of the Contractor to ensure that the above-mentioned boxes and distribution boards are correctly built in and are firmly bedded and cemented into the walls, plumb and square.

The Contractor shall, unless otherwise specified, do all necessary chasing and cutting of bricks. All electrical materials (e.g. conduits up to 40 mm for UG cables, conduits, conduit boxes, distribution boards etc) must be supplied by the Contractor who must arrange to have these on site, and positioned when required for the building work. A competent Electrical Artisan must be in attendance and ensure that the conduits etc are correctly installed and positioned.

The Contractor is to ensure that tubing installed in chases is securely nailed and covered by a layer of 5:1 mixture of coarse sand and cement, finished flush with brickwork and that switch and plug boxes finish flush with the finished wall surface.

The Contractor is to ensue that below distribution boards connected by means of under-ground cables, a 230 mm wide by 115 mm deep cavity in the wall from the cable pipe to the distribution board is to be provided by the Contractor, or alternatively, cable sleeves as specified.

3. **PLUGGING OF WALLS**

Only approved plastic plugs shall be used to secure conduit or equipment up to 5kg mass. The use of round-headed screws only will be permitted.

Heavier equipment shall be secured by means of approved expansion bolts.

Wood plugs and any plugs in the joints in brick walls are not permitted.

4. **FIXING TO CONCRETE CEILINGS**

Ceilings mounted equipment other than luminaires shall be secured to concrete ceilings by means of expansion bolts, shot bolts or "Robot" tools bolts or as expressly specified for the service.

5. WIRING

5.1 PVC Insulated Single Core Medium Voltage Conductor

The conductor is to be of high conductivity copper wire insulated with Polyvinyl Chloride. The cable shall be finished in the required colours and shall be in accordance with SABS 1507 and 1574.

Circuit wiring shall be of the Loop-in system and no wiring joints in the conduit or conduit fittings will be permitted. Not more than two conductors of a kind will be allowed at any outlet point. the end strands of cables, whether single or looped which have to be connected to terminals of switched, plugs, lamp-holders, fittings and distribution boards, etc, are to be tightly twisted together. Cutting away of wire strands of any cable will not be allowed. Only one circuit in any one conduit will be permitted unless otherwise specified.

Conductor sizes shall be as follows except where otherwise specified:

Lighting circuits	1,5 mm^2	
Bells circuits	1,5 mm^2	
Clock circuits	1,5 mm^2	
Incinerator circuits	2,5 mm^2	
Ironing circuits	2,5 mm^2	with 2,5 mm^2 insulated earth wire
Plug circuits	4,0 mm^2	with 2,5 mm^2 insulated earth wire
Geyser circuits	4,0 mm^2	with 2,5 mm^2 insulated earth wire
Heater circuits	4,0 mm^2	with 2,5 mm^2 insulated earth wire
Stove	10 mm^2	with 6,0 mm^2 insulated earth wire
Motor circuits		
Up to 4kW single phase	4,0 mm^2	with 2,5 mm^2 insulated earth wire
Up to 11kW three phase	4,0 mm^2	with 2,5 mm^2 insulated earth wire

To avoid deformation of PVC insulated cables at temperatures in excess of 57° C, they shall not be brought directly on to the terminals of appliances such as electric heaters, or any other electrical appliances or apparatus (including luminaires) which have a temperature in excess of 57° C. They shall terminate in a suitable terminal box as near to the appliance or fittings as possible and connect up from thereon, with heat resistant conductor.

6. MOUNTING AND POSITIONING OF LUMINAIRES

Luminaires and installation to comply with SABS 1464 Parts 1 to 22 and IEC 598-1 and IEC 60598 as applicable.

The contractor shall, in the case of board and acoustic tile ceilings (i.e. as opposed to concrete slabs), ensure that the luminaires are symmetrically positioned with regard to the ceiling pattern.

The layout of the luminaires as indicated on the drawings shall be adhered to as far as possible. The exact positions must be confirmed on site with the Head : Works.

Except where otherwise specified, pendant luminaires are to be mounted with the bottom of the fittings 2,5 m above finished floor level, mounted on either metal discs or wood blocks.

Under no circumstances shall cover strips be cut to accommodate wood blocks. Wood blocks must be neatly slotted to fit over cover strips and are to be secured by a minimum of two screws, which shall penetrate at least 25 mm into solid wood. Ceiling cover strips shall be neatly cut to accommodate fluorescent luminaires.

Where ceilings are raked, all incandescent luminaires are to be mounted on shaped leveling wood blocks securely fixed to the ceiling. Batten holders shall be secured to woodblocks by suitable brass screws. Fluorescent luminaires are to be mounted direct on raked ceiling without leveling blocks.

Fluorescent luminaires to be mounted on concrete ceilings shall be screwed to the outlet boxes and additionally supported by means of 50 x 6 mm expansion bolts. The bolts are to be ¾ of the length of luminaires apart.

Where a number of luminaires are installed end to end, outlet points must be provided after every second luminaire unless otherwise indicated on the drawing.

The luminaires are to be joined together by means of 20 mm conduit nipples, lock nuts and male brass bushes, and the wiring led through the channels of the luminaires. The Contractor shall ensure that all such rows are correctly lined up and that the rows are parallel with the relevant building line.

The luminaires are to be jointed together by means of 20 mm conduit nipples, lock nuts and male brass bushes, and the wiring led through the channels of the luminaires. The Contractor shall ensure that all such rows are correctly lined up and that the rows are parallel with the relevant building line.

Incandescent luminaires are to be screwed directly to outlet boxes in concrete slabs and in board ceilings. In board ceilings the conduit box and the conduit shall be secured to the timberwork of the ceiling in such a manner that it shall support any incandescent luminaire, which is designed to be fixed to a normal conduit box.

Fluorescent luminaires shall be secured to board ceilings by means of the conduit box and 6 mm bolts passing through the boards and brandering.

7. BATTEN HOLDERS

B.C. batten holders shall be of brass or moulded plastic reinforced type complete with shade ring. The batten holders shall comply with SABS IEC 60238 and SABS IEC 61184. All lamp holders are to have brass terminals with screw type connection.

8. **LAMP HOLDERS**

Edison screw lamp holders	:	SABS IEC 60238
Bayonet lamp holders	:	SABS IEC 61184
Lamp holders for tubular fluorescent lamps	:	SABS IEC 60400

B.C. screwed lamp holders shall be of brass 20 mm E.T. complete with shade ring and shall comply with SABS IEC 60238 and SABS IEC 61184 with screw type connection terminals.

9. **SWITCHES AND SOCKET OUTLETS**

Switches SABS IEC 60669 as applicable and socket outlets SABS IEC 60884 as applicable shall be of the most modern manufacture and bear the SABS mark.

Flush switch and plug cover plates shall, unless otherwise specified, be of anodized aluminium of thickness not less than 0,9 mm, satin or other approved finish as directed and otherwise to be fully in accordance with SABS IEC 1084 for cover plates and SABS 1085 for wall boxes.

10. **POSITIONS OF SWITCHES AND SOCKET OUTLETS**

Except where otherwise specified, lighting switches and socket outlets are to be installed 1,4 m above finished floor level.

All mounting heights specified are to be measured from finished floor level to the bottom of the outlet box.

Where the lower portion of the wall consists of face brickwork and the upper portion of plastered finish, switches and socket outlets are to be mounted in the plastered surface, provided that the lower edge of the plasterwork does not exceed a height of 1,5 m above finished floor level in which case the switches or socket outlets are to be installed in the face brick dado.

Where socket outlet and switch boxes have been installed with fixing lugs below finished wall surface, only approved distance pieces required to compensate for the recess shall be used. The lengths of distance pieces are not to exceed 15 mm.

Unless otherwise approved, light switches adjacent to doors are to be installed at the lock side of the door. Where the lock position is not indicated on the drawings, its position shall be ascertained before the switch box is installed. Switches are to be installed 150 mm from the reveal, or centrally if there is a fitting near the door.

All switch and socket outlet boxes shall be installed plumb, and built into the wall with a 1:1 mixture of cement and sand.

Industrial type switches and socket outlets shall be neatly recessed into the surface of plastered walls to avoid sets or alternatively spacer bar saddles may be used.

Deep type boxes may be used where switches or socket outlets are back to back, but where one side only is to be utilized at the time and the other is for future use, the side for future use shall be suitably covered with a metal cover plate.

11. LOW TENSION SWITCHBOARDS

Low Voltage switch gear and control gear to comply with SABS 1473 and SABS IEC 60947 and SABS 60349.

Where switchboards are to be installed in switch rooms or switch cupboards, the Contractor must ensure that the boards are manufactured to suit the dimensions of the rooms or cupboards.

Low tension switchboards shall be specified in detail for each service, but shall generally conform to the following:

They are to be of strong and rigid construction, with suitable angle, channel or folded steel framework. They are to be flush fronted and totally enclosed with sheet steel panels suitably formed at the edges and reinforced to prevent distortion. Unless otherwise directed, all front panels must be at least 2 mm thick and all other panels at least 1.6 mm thick. Panels are to be secured to the framework with studs and chromium plated dome nuts (self-tapping and similar screws are not permitted).

Switches, etc, are to be mounted on metal frames within the boards to give flush front panels. Equipment of normally surface mounted types such as energy meters, time switches and contractors, are to be mounted on inner metal trays behind hinged front panels. In the case of supply authority meters the hinged front panels must have transparent inserts.

All metal work of the boards must be thoroughly degreased, primed with PA 10 self etching primer and finished with one coat of undercoat and two coats of electrical orange high gloss enamel, unless otherwise specified.

All accessible current carrying parts, bus-bars, connecting strips, collector bars, etc, are to be adequately insulated in phase colours and suitably braced to withstand projected fault currents.

Connecting strips and collector bars must be of sufficient cross sectional area to carry full rated current of the switches served, irrespective of the fuse of trip rating.

The complete distribution board including bus-bars must be suitably constructed to withstand fault currents specified.

Connections to bus-bars are to be made by means of lugs suitably bolted and locked with high tensile bolts and connections to lugs must be effected by means of a crimping tools.

Incoming and outgoing bus-bar studs, where required, must be suitably insulated where they pass through panels of the board, and firmly supported within the board.

Where applicable, incoming and outgoing collector bars for cables in parallel must so arrange that the multiple cable ends can be connected to the bars with reasonably short tails which do not have to cross.
Cable supports must be placed at suitable heights having regard to the bending radius of the cables concerned and convenience in making off.

Wall-mounting and floor-standing back to wall type boards must be provided with full easy access to all equipment and wiring without any necessity of disconnecting or removing of any of the equipment mounted in the board.

Clear visible indication of all switch positions must be provided and the switches must be clearly labeled as directed by the Head : Works.

The details of construction proposed, and the Head : Works must approve all equipment of switchboards: Works before manufacture is commenced.

12. DISTRIBUTION BOARDS

12.1 Approval

The Head : Works must approve the details of construction proposed and all equipment within distribution boards: Works before manufacture is commenced.

12.2 Flush Mounting Distribution Boards

These shall be generally manufactured in accordance with SABS 1765. The board shall consist of two panels fitted side by side with common bonding tray and attached to a common architrave. One panel shall accommodate all single phase MCB's and the second panel shall accommodate the main isolator, main bus-bars and the triple pole MCB's. Chassis shall be of rigid channel section rust proofed steel with clip-on trays for the single pole MCB's. The main isolator is to be mounted at the bottom of the second panel with the triple pole circuit breakers above.

12.3 Surface Mounting Distribution Boards

These shall be generally manufactured in accordance with SABS 1765, with two panels as for flush boards.

12.4 Single Phase Distribution Boards

Single Phased boards shall be generally constructed as three phase boards except they shall have a single panel. Single phase boards shall be mounted with the bottom of the architrave 1,5 m above finished floor level unless specifically directed otherwise.

12.5 Distribution Board – In Roof Spaces

Where distribution boards are installed below a roof space, a minimum of 2 x 20 mm and 1 x 25 mm spare conduits are to be run from the distribution board into the roof space.

13. METER BOXES

The meter box shall be mounted with the top 1,7 m above finished ground level. Surface mounted meter boxes shall be secured by at least 4 x 10 mm expansion bolts.

Service cables entering the meter box shall be protected by means of a suitably sized galvanised pipe extended 450 mm below the ground surface and securely saddled to the wall and bonded to the meter box.

14. CONNECTIONS TO OUTLETS

14.1 General

Where connectors are used to connect to the wiring of luminaires and other appliances, the connectors shall comply with SABS Specification 1239.

14.2 Connection to Stoves

14.2.1 General

The connection to an electric stove, unless otherwise specified shall consist of 2 x 10 mm^2 conductors and a 6 mm^2 insulated earth wire in 25 mm conduit. The stove shall be controlled by a 60 Amp micro gap switch of approved make and the connection shall be by means of a 45 Amp 3 pin stove plug of the "Cape Town" type. Cable ends, which are to be connected to the stove, shall be equipment with suitable soldered or crimped lugs. The connection between the stove plug and stove shall be by means of flexible conduit.

Except for high school domestic science unit kitchens (see Clause 14.2.2), the conduit shall be chased into the wall and fitted with a switchbox for housing the micro gap switch and a 25 mm circular conduit box over which the stove plug will be mounted. The stove plug shall be fitted with an adaptor plate and shall be screwed directly to the conduit box by means of round head metal screws. The plug outlet shall face downward.

The stove plug and switch shall be mounted 430 mm and 1,4 m respectively above finished floor level unless otherwise specified or indicated on the drawings.

14.2.2 Stove Connections in High School Domestic Science Unit Kitchens

Connections to stoves in High School Domestic Science Unit Kitchens, where the stoves are situated in front of a fitting, shall be generally as specified in Clause 14.2.1 except that the 25 mm diameter conduit shall be run in the floor slab, from the distribution board to a position to the right of the stove. A pedestal, which is complete with a 45 Amp 3 pin "Cape Town" type cooker plug, mounted on the back, shall be fitted over the conduit and securely bolted to the floor by means of expansion bolts. The plug circuit, which passes through the pedestal, is to be on a separate circuit.

14.3 Connections to Hot-water Cylinders

The connections to hot-water cylinders not exceeding 3kW loading shall consist of 2 x 4 mm^2 PVC conductors and 1 x 2,5 mm^2 earth wire in a 20 mm diameter conduit from the distribution board. The conduits shall be chased in the wall and shall terminate at the side of the cylinder in a box over which is to be mounted a double pole isolator with pilot light.

The final connection between the isolator and cylinder shall be by means of silicone heat resistant conductors in 20 mm diameter flexible conduit.

Connections to roof mounted hot-water cylinders shall generally be as specified above with an isolator with pilot light mounted adjacent.

14.4 **Connections to Power Points**

Connections to electric motors and fixed apparatus to vibration shall, unless otherwise specified or indicated on the drawings, have final connections consisting of conduit and flexible tubing or reinforced hose in accordance with Clause 1.3 of this specification and PVC cables and earth wire of the required size.

An isolator shall protect all fixed apparatus and where necessary a starter fitted with a no-volt coil and overload protection adjacent to such apparatus.

Power points for connection of fixed apparatus to be installed by others, shall terminate in an approved type wall mounted switch unless otherwise specified.

The minimum conductor size for all power points shall be 4 mm^2 unless otherwise specified.

14.5 **Underground Service Connection**

This clause refers to underground service connections not provided by the Supply Authority.

The service cable and earth wire to be connected at the supply point in accordance with Clause 15.8 of this specification, and unless otherwise specified, shall be aid 600 mm below ground level throughout and otherwise fully in accordance with Clause 15 and all applicable sub-clauses thereof. Cable entries to meter boxes shall be in accordance with Clause 13 and other entries shall be by pipe or duct as directed.

14.6 **Connections to Outbuildings**

Connections to outbuildings shall be made by means of underground cable only, laid in accordance with Clause 15 and all applicable sub-clauses.

Where the cable is run from the roof space of the main building, it shall be enclosed in suitably sized galvanised pipe built into the wall or run surface as directed. Surface run pipes shall be securely saddled at 1,8 m centers. Where the cable connects to the conduit in the roof space, a suitable joint box shall be provided or alternatively the cable may be taken through the roof space, a suitable joint box shall be provided or alternatively the cable may be taken through the roof space with fixings at regular intervals, and down to the main board. At the outbuildings, the cable shall be enclosed in a suitably sized galvanised sleeve pipe built into the wall or run surface and terminated in the distribution board tray.

14.7 **Connection and Mounting of Cable Fed Street/Site Lighting**

Street/site lights shall in all cases, except where otherwise specified, be fed by underground cable. Unless otherwise directed, a suitable terminal board shall be provided in the base of the lighting pole for the connection of the incoming and outgoing cables, the feeds from the terminal board to the fitting shall be as specified.

"Surfix" cable and compression glands shall be installed between terminal board and cross arm/bracket mounted luminaires. The terminal board shall also accommodate a miniature circuit-breaker in the phase connection to the fitting. Poles intended for mounting directly in ground are to be provided with a 300 x 300 mm base plate.

15. UNDERGROUND CABLES

1000 volt PVC SWA and 110 Volt PILCA cable and accessories shall be in accordance with the relevant SABS specifications to SABS 1507.

The storage, transportation, handling and laying of underground cables shall be according to the manufacturer's requirements and the Contractor shall have adequate and suitable equipment and labour to ensure that no damage is done to cables during such operation. All cable pipes and ducts entering buildings are to be sealed against the ingress of vermin, water, etc.

15.1 Trenching

Cables, unless otherwise specifically directed, shall be laid at a depth of 600 mm below ground level. Trenches shall not be less than 300 mm wide for one to three cables, and the width shall be increased where more than three cables are to be laid together so that the cables may be placed at least 75 mm throughout the run.

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

15.2 Cable Joints

Joints in underground cable runs will not be permitted unless unavoidable and at the discretion of the Head : Works. Where cable joints are unavoidable, the cable jointer is to work efficiently and cleanly and so that each end of the cables to be joined may have a minimum of 0,9 m of slack disposed in a loop without stress. Back-filling under joints must be firmly tamped to prevent any subsequent settling.

15.3 Bedding

In trenches made in intermediate, hard rock, or boulder material, the cables shall be laid on a 75 mm thick bed of earth and be covered with a 150 mm layer of earth before the trench is filled in. The Contractor to supply all earth required for trench filling.

15.4 Laying

Cables shall be removed from the cable drum in such a way that no twisting, tension or mechanical damage is caused, and must be adequately supported at short intervals during the whole operation. Particular care must be exercised where it is necessary to draw cables through pipes and ducts, to avoid abrasion, elongation or distortion of any kind. The ends of such pipes and ducts shall be sealed to approval after the drawing in of the cables.

15.5 **Back Filling**

Back filling after bedding (see Clause 15.3) is to be carried out with a proper grading of the material to ensure settling without voids, and the material is to be tamped down after the addition of every 150 mm. The surface is to be made good a required.

Back filling of cable trenches must not be commenced until after the cable trenches and laid cable(s) have been inspected by the Head : Works. Where a Contractor fails to observe this requirement he may, at the discretion of the Head : Works, be required to re-open such cable trenches for inspection at his own expense.

15.6 **Protection of Cables**

Where so directed by the Head : Works, concrete or other warning covers shall be placed over cables above the top bedding layer. Cable pipes when directed are to be installed at road and other crossings.

15.7 **Marking of Cables**

Cable marking tape is to be supplied by the Contractor and is to be laid 150 mm below ground over a cable run and as may be directed by the Head : Works to give early indication of underground cable runs.

15.8 **Joints and Termination of Cables**

Joints in underground cables and terminations shall be made by means of "Scotch Cast" or other approved epoxy-resin pressure type jointing kits. Low tension PVC cables are to be made off with sealing glands and materials designed for this purpose, which must be of approved make.

15.9 **Sealing of Paper Insulated Cable Ends**

Where cables are cut and not immediately made off, the ends must be sealed without delay. If cables are cut and the ends not immediately made off or sealed, the cable may be rejected and the Contractor will be required to replace it at his own expense.

15.10 **Earth Wires**

Except where specifically directed otherwise, earth continuity conductors are to be run with all underground cables constituting part of a low tension distribution system. Such earth continuity conductors shall be bare copper wire of a cross sectional area in accordance with the Code of Practice 0142 but shall not be less than 4 mm^2 nor more than 70 mm^2. The earth continuity conductor is to be bonded to the cable armouring, and to the lead sheath if any, at each termination, as well as to the local earth bard. The earth wire must be secured to the cable at 1,8 m centers.

15.11 **Opening Up of Existing Cables**

Where it is necessary to expose existing buried cables for any purpose, or to excavate in the vicinity of existing buried cables, pipes, etc, every care is to be exercised and only labourers experienced in such work, and duly warned by the Contractor, shall be employed thereon.

15.12 **Definitions for Classifying of Excavation**

(a) Soft Excavation – shall be excavation in material that can be efficiently removed by a back-acting excavator of flywheel power approximately 0,10kW per millimeter of tinned-bucket width, without the assistance of pneumatic tools such as paving breakers, or that can be efficiently loaded without prior ripping or stockpiling by a rubber tyred front-end loader approximately 15T mass and a flywheel power of approximately 100kW.

(b) Intermediate Excavation – shall be excavation in material that requires a back-acting excavator of flywheel power exceeding 0,10kW per millimeter of tinned-bucket width and the assistance of pneumatic tools prior to removal by equipment equivalent to that specified in (a) above.

(c) Hard Rock Excavation – shall be excavation in material that cannot be efficiently removed without blasting or without wedging and splitting prior to removal.

(d) Class A Boulder Excavation – shall be excavation in materials containing more than 40% by volume of boulders of sizes between 0,03 cubic meter and 20 cubic meter in a matrix of softer material or smaller boulders.

Note: (1) Excavation of solid boulders or lumps of size exceeding 20 cubic meter will be classified as hard rock excavation.

(2) Excavation of fissured or fractured rock will not be classed as boulder excavation but as hard rock intermediate excavation according to the nature of the material.

(e) Class B Boulder Excavation – shall be excavation of boulders only in a material containing 40% or less by volume of boulders of size between 0,03 cubic meter and 20 cubic meter in a matrix of softer material or smaller boulders.

Note: Those boulders that required individual drilling and blasting in order to be loaded by a back-acting excavator as specified in (a) above, or by a track type front-end loader, will each be separately classed as Class B Boulder Excavation.

16. EARTHING

16.1 Main Earthing

The type of main earthing shall be as required by the Supply Authority, if other than the Head : Works and in any case as directed by the Head : Works who may require additional earthing to meet test standards.

Where required, an earth mat is to be provided, the minimum size, unless otherwise specified, being constructed from copper straps 950 x 25 x 3 mm at 230 mm centers and braced at all intersections. Alternatively or additionally earth rods or trench earths may be required, as the Head : Works may direct, and installed according to his instructions.

All earth electrodes and connections thereto must be approved "in-situ" by the Head : Works before back-filling.

The electrical installation shall not be earthed by means of the lightning arrester earth electrode, if such is included in the installation, but may be bonded thereto.

16.2 Earthing in Installations

The installation shall be effectively earthed in accordance with the relevant sections of the Code of Practice 0142 and the requirements of the Supply Authority.

All hot and cold water and waste pipes are to be effectively bonded by means of 12 x 1,5 mm solid copper tape (perforated tape or wire will not be permitted), clamped by means of brass bolts and nuts. Bonding tapes exceeding 75 mm in length must be fixed to the wall by means of No. 6 x 20 mm brass screws and plastic plugs not exceeding 150 mm centers. Main earth copper tapes where installed less than 2,5 m from ground level, must be run in 20 mm diameter conduit securely saddled to the wall.

Gutters and down pipes are to be bonded by means of 6 mm round headed brass bolts, with nuts and washers. Self-tapping screws are not permitted.

Connections from the earth bar or terminal on the main board must be made to a visible cold water main, the incoming service conductor, if any, and the earth mat or plate (where such is required) by means of either 12 x 1,5 mm solid copper tape or bare 25 mm^2 copper wire, or such larger conductor as the Head : Works may direct. From each distribution board separate earth conductors are to be taken to the main earth bar or terminal on the main board. Each conductor shall consist to stranded copper conductors drawn into the conduit together with the distribution board feeders. The size of the earth conductors to be in accordance with the requirements of the Code of Practice 0142 or as specified.

Earthing clips shall be made of not less than 0,9 mm thick copper strips not less than 12 mm wide. They are to be complete with 25 x 7,7 mm brass bolts, washers and nuts and must be constructed so that the clips will fit firmly to the conduit without any additional packing.

Adjustable earth clips are not permitted.

17. EXISTING BUILDINGS

17.1 Occupied Buildings

Where work is to be carried out in occupied buildings the Contractor must arrange to carry out the installation with as little interruption to services and discomfort to the occupants as possible.

17.2 Temporary Connections

Temporary connections shall be provided where necessary for continuity of services, and as directed by the Head : Works. The contractor must ensure that such connections are both electrically safe and free from physical hazard.

17.3 Old Materials

Unless otherwise specified all existing materials removed by the Contractor shall remain the property of the Head : Works and are to be handed to the Head : Works.

17.4 Making Good

Any damage which may be done to the plaster work, floors, ceilings, wood and paint work, furniture and other equipment in the building, etc, during the progress of the electrical installation shall be repaired and made good by the Contractor to the satisfaction of the Head : Works.

18. COMPLETION

18.1 Balancing of Load

The Contractor is required to balance the load as equally as possible over multi-phase supplies.

18.2 Tests

The installation shall be tested by the Contractor as the service progresses or as required by the Head : Works and upon completion, for earth continuity and insulation. The final test before the taking over of the installation shall be made in the presence of the Head : Works.

The mandatory "Certificate of Compliance" shall be issued by the Contractor to the Supply Authority, with a copy to the Head : Works prior to first delivery being taken.

18.3 **Labelling**

All circuits and apparatus on switchboards shall be suitably correctly labeled by means of engraved plastic labels (white lettering on black), which are to be either bolted or screwed to the equipment panel, or fitted in channeling provided below the switch gear.

Sub-circuits are to be numbered and a legend detailing the circuits is to be framed and fitted to the door of the distribution board.

All other equipment is to be individually labeled to indicate the function.

All switchboards are to be fitted with a label on which the designation of the board is clearly indicated.

A separate engraved label depicting the origin and cable/conductor size shall be fixed below the main switch.

18.4 **Finishes**

Covers for all boxes, expansion boxes, etc, shall be finished to match the paint work of the ceiling or wall surface or as specified.

18.5 **Site Drawing**

On all completed new work or where specifically called for in the Tender Document, the Contractor shall, on completion of the works, submit to the Head : Works, a marked up site plan indicating the exact underground cable reticulation.

19. **POWER DUCTING FOR SCHOOL SCIENCE LABORATORIES**

The ducting shall be "Ductline 3" supplied by Messrs. Lascon Lighting, 102 Malbourne Road, P.O. Box 2479, Durban 4000: Telephone 031-2075081 or other approved.

20. **SPEAKER AND MICROPHONE OUTLETS**

Speaker and microphone outlets are to conform to the following details:

1. Speaker outlet – To have one flat and one round pin.

2. Microphone outlet – To have one round pin only.

Both female and male parts to be supplied and installed by the Contractor.

21. **BELLS AND BUZZERS**

21.1 **Bells**

Bells for schools and hostels shall be 220 Volt AC or 24 Volt DC as specified for the service. They are to be of robust construction encased in a sturdy cast metal weather-proof case. They are to operate on the frequency of the supply. They shall have an adjustable stabilizing spring, gold-silver contact points and 150 mm gongs.

21.2 **Doorbells, Buzzers and Bell Transformers**

These will be as specified for each service.

21.3 **Bell Pushes**

Except where otherwise specified, bell pushes shall be of the flush type suitable for mounting in a standard 100 x 50 mm box. They shall be clearly marked as a bell push and shall be fitted with satin finished anodized aluminium cover plates.

22. **SIGNAL TIMERS**

22.1 **Primary Schools**

The timer shall be designed to automatically signal the start and finish of school periods by the switching of a bell circuit and is to comply with the following specification:

1. The mechanism may be synchronous motor or quartz movement driven with a 24 hour dial or digital time read-out suitable for operation on a 220V 50Hz supply and is to be provided with a spring or battery reserve of a least 24 (twenty four) hours.

2. The unit is preferably to have minute to minute timing for a 24 (twenty four) hour period although 5 (five) minute intervals are acceptable, and is to be provided with Weekend lockout. Signal periods shall be adjustable from 5 – 45 seconds.

3. The unit shall be housed in a metal or plastic case with detachable front cover suitable for wall mounting.

4. Timers with punch tape programming are not acceptable.

22.2 **High Schools and Colleges**

Timers for these institutions shall generally be as for Primary Schools but are to have at least 3 (three) separate programmes and be fitted with three push buttons for independent manual operations for testing of each programme, plus an on/off switch for each programme, which does not affect the running of the clock.

23. **CLOCKS**

Electric clocks shall be of the quartz electronic battery operated type, with a dial of 250 mm diameter. The dial shall be white, with distinctive minute markings and chapters shall be black Arabic figures. Time adjustment shall be simple. Where mains operated electronic clocks are specified, these shall be of the synchronous self starting type, suitable for a 200 – 250 V 50 Hz AC supply

24. **TIME SWITCHES**

The time switch shall consist of a single pole switch with silver to silver or other approved contacts operated by a quartz movement with a 24 hour reserve.

A suitable 24 hour, night and day dial, with hour indicator and two adjustable strikers, one OFF and one ON must be provided. The whole mechanism is to be totally enclosed in a dust proof case.

The current rating shall be required and the switch is to be suitable for operation on 220 volt 50 Hertz AC supply. Time switches used for under floor heating are to be fitted with weekend cut-out.

25. **MOULDED CASE CIRCUIT BREAKERS (INCLUDING MINIATURE)**

Circuit breakers shall be of the size and type as directed and specified for the service. They shall comply with SABS Specification 156 and SABS IEC 60947-2.

26. **SWITCHES: ON-LOAD FAULT MAKING (CIRCUIT BREAKER TYPE) WITHOUT TRIPS**

The switches shall be triple pole, hand operated, panel mounting air break type, having continuous current rating as specified and suitable for operation of 380 – 440 Volt 50 Hz AC system.

The contacts are to be of silver alloy and the switch mechanism shall be of the quick-make, quick-break type.

27. **SWITCHBOARD EQUIPMENT**

Switchboard equipment such as switches, circuit breakers, etc, shall be as directed and specified in the detail specification for the service.

Circuit breaker equipment of SABS IEC 60934.

28. **FUSE-SWITCH UNITS (WITH HRC FUSES)**

The fuse-switch unit is to be of the double pole, or triple pole or triple pole with neutral link type, and of the required current rating, as specified for the service and must be in accordance with BS EN 60947-3.

The fuse links must be fully isolated when the switch is in the open position, and interlocks must be provided to prevent the switch being operated with the cover open.

The fuse links shall comply with SABS Specification 172 and SABS IEC 60269-1 to 4.

29. **BUS-BAR COPPER**

Bus-bar copper must be fully in accordance with Tables A1 and A2 of SABS 1473-2 and SABS IEC 60439-2.

30. **SPECIFICATION COMPLIANCE**

The complete installation shall comply with the requirements of this specification. Should any differences or contradictions exist between this Specification and the detailed requirements for a specific installation, then the detailed requirements shall take precedence.

KWAZULU-NATAL PROVINCE
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DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 3

LIGHTNING PROTECTION SPECIFICATIONS

LIGHTNING PROTECTION INSTALLATION

GENERAL SPECIFICATION

1. SATISFACTORY INSTALLATION

The whole of the installation shall be carried out in accordance with:

(a) The latest S.A.B.S. Code of Practice for the Protection of Structures against Lightning - S.A.B.S. 03 ; SABS IEC 61024 (1) , 61024 (1 -1); SABS IEC 61312 (1) ; SABS IEC 61662 & NRS 042.

(b) The KwaZulu-Natal Department of Works General Electrical Specification.

(c) The Municipal By-Laws and any other special requirements as deemed necessary by the Local Supply Authority;

(d) Local Fire Regulations.

2. S.A.B.S. APPROVED DRAWINGS

SABS Approved drawings are not required for this project.

3. TEST ON COMPLETION

Upon completion of the lightning protection system, the following tests shall be witnessed by an appointed representative of the Employer. The results shall be recorded on suitable test certificates which must be signed by both the Contractor and the Employers representative. A sketch must be included on each test certificate indicating the positions of each earth electrode in relation to some permanent reference point. It must also indicate the positions at which tests were carried out, the type of test and the results of these tests.

3.1 Earth Resistance Test

The Earth Resistance Test shall involve measuring the resistance to earth of each rod-type electrode, or group of rod-type electrodes, or trench earth which would normally be connected to one down-conductor or earth terminal. This test must be made with the electrodes completely disconnected from any part of the structure or lightning protection system.

3.2 Electrical Continuity Tests

(a) **External Down-Conductors**

Electrical continuity between the lower ends of external down-conductors which must all be disconnected from the earthing system during the test shall not exceed 1 (one) ohm.

(b) Metallic Services

Electrical continuity between any metallic structures of services (e.g. rainwater pipes) which form an integral part of the lightning protection system shall not exceed 1 (one) ohm. These tests should be carried out with all other components of the lightning protection system disconnected from the component being tested.

4. DESCRIPTION OF MATERIAL

4.1 Air Terminals and Down-conductors

All conductors must be in accordance with the requirements of BSS 1474 or American Standards Specification 6063. All aluminium conductors shall have a cross-section area of not less than 30 mm^2 (domestic dwelling only) or 50 mm^2 for all other applications. The dimensions of flat section conductors to be 20 mm x 3 mm. Where conductors are mounted in stand-off guides, the cross-section area of the conductor must be not less than 70 mm^2 to give adequate mechanical strength.

4.2 Conductor Guides

The conductor must be mounted in aluminium alloy guides conforming with the material specification given in 4.1 above. The guides must allow for free longitudinal movement of the conductor to cater for expansion and contraction of the system caused by temperature variation. The minimum thickness of any part of the guide shall not be less than 3 mm. The guides must be securely attached to the structure using two stainless steel screws and plugs, the use of plated screws is not permitted.

The conductor system shall be supported in guides so that an air gap exists at all times between the aluminium and the surface of the structure, the guides being seated upon plastic or other similar insulating material. Should conductors be installed directly upon the surface of concrete or cement plaster, an insulating strip is to be installed over its whole length to prevent contact between the two surfaces. Guides shall be installed to support the conductor at intervals not exceeding 1,2 metres horizontally or 1,5 metres vertically.

N.B.: No part of an aluminium conductor system must be allowed to come into direct contact with concrete or cement plaster as this may cause the aluminium to corrode.

4.3 Expansion Loops

Where conductors are installed horizontally without deviation from a straight line over long distances, expansion loops must be provided at distances not exceeding 30 metres. These expansion loops must have a cross-sectional area which is at least equal to that of the conductor.

4.4 Protection of Down-conductors

Where external down-conductors are installed in areas which are readily accessible to the public, the lower ends of the conductors shall be enclosed in a semi-rigid insulating material. In the case of a circular section conductor this shall comprise a 2 metre length of 20 mm diameter P.V.C. conduit. This conduit shall be securely attached to the wall by means of galvanized steel saddles fixed with stainless steel screws and plugs, spaced at intervals not exceeding 1 m. Where a flat section conductor is used this shall be covered by a similar length of 25 mm P.V.C. conduit. The lower end of the conduit shall be positioned as close as practicable to ground level, i.e. immediately above an aluminium to copper joint. The ends of the conduit shall not be sealed.

4.5 Earthing Electrodes

Earthing electrodes must consist of either copper-clad steel rods not less than 12 mm in diameter and having a minimum copper thickness of 0,20 mm driven into the ground, or a 50 mm^2 (35 mm^2 for domestic dwellings) bare copper conductor buried in a trench, or a combination thereof. Where copper clad steel electrodes are used they must have a suitable bond between the steel core and copper exterior to prevent moisture ingress between the two metals. Where it is necessary to extend earth rods, an electrolytically compatible corrosion resistant, coupling device, which prevents ingress or moisture into the joint shall be used. The copper conductor below the down-conductor joint shall be covered by a semi-rigid P.V.C. conduit for a distance of approximately 200 mm above ground and 400 mm below ground.

4.6 Joints Above Ground

Circular section aluminium conductors shall be jointed by aluminium ferrules or lugs which are securely crimped into place. Aluminium lugs must be bolted together using 10 mm diameter aluminium bolts and washers. The material specification for these components must conform with that laid down in paragraph 4.1. Alternatively heavily tinned copper lugs and ferrules may be used. The lugs should be joined together by means of 10 mm diameter copper, brass or bronze bolts and washers. Care should be taken to inhibit corrosion where dissimilar metals are used by thoroughly cleaning the surfaces of the metal before assembly and subsequently sealing the joint with an inert tenacious compound or tape.

Flat section aluminium conductors shall be joined by double riveting, using aluminium rivets which comply with the material specification laid down in 4.1. Alternatively 2 x 6 mm diameter stainless steel bolts, nuts and washers may be used. Fold over type bends will not be permitted.

Down-conductors are to be terminated approximately 200 mm above finished ground level. Circular section aluminium is to be jointed to a 50 mm^2 (35 mm^2 in the case of domestic dwellings) stranded copper conductor by securely crimping in place two heavily tinned lugs and bolting these together using 10 mm diameter copper, brass or bronze nuts, bolts and washers.

N.B. : Under no circumstances shall aluminium conductors be buried in the ground.

4.7 Joints Below Ground

A joint in the stranded copper conductor which forms part of the earthing system must be made by using a crimped copper ferrule clamping (not lugs) using two copper line taps of suitable dimensions, or exothermic welding. The copper earth conductor must be joined to an earth rod by either clamping, using a standard earth rod clamp or copper line tap or by exothermic welding. Joints which are made between dissimilar metals (i.e. copper conductor to galvanized steel water main), must be thoroughly cleaned before assembly. They shall be rendered watertight using waterproof adhesive tape on a suitable compound for a minimum distance of 200 mm in all directions from the joint.

4.8 Bonds

Where it is necessary to bond the aluminium conductor to any other metallic surface, this must be done by bolting or riveting. When attaching aluminium to a dissimilar metal the joints are to be thoroughly cleaned and sealed to prevent corrosion.

5. GENERAL INSTALLATION PROCEDURE

5.1 Air Terminals for Non-metallic Pitched Roofs

Aluminium conductors are to be installed along all ridges of roofs and projections such as dormer windows, etc., terminating at the ends with conductors running downwards over the surface of the roof and the eaves. Non-metallic chimneys must be protected by means of a finial of sufficient length to cover the chimney within a 45° angle struck downwards from its point. Alternatively it should have a conductor installed in the form of a closed loop upon the upper surface. The conductors are to follow the outer contour of the stack and must be bonded at a convenient point to the nearest component of the air terminal system.

N.B. : This bond may run in a horizontal or downward direction, but under no circumstances must any part of it run above horizontal.

Conductors may be dead-ended (i.e. have one end free and unbonded), providing that the length of such a conductor does not exceed 10 metres and that the unbonded end is either at the same level or higher than the bonded end. This technique may be used where ridge conductors are installed over dormer windows, etc.

In all cases where metallic gutters have been installed along the eaves of a pitched roof, these must be bonded to the air terminal system. Where metallic gutters do not exist, however, a conductor must be installed over the surface of the roof at eaves level to which the remainder of the air terminal system is to be bonded, with the following exceptions :

(a) Where the maximum distance from the ground level to the eaves of the building is less than 4 metres and the pitch of the roof is more than 1 in 2 (27° from the horizontal).

(b) Where the maximum distances from ground level to the eaves is less then 7 metres and the pitch of the roof is more than 1 in 1,5 (34° from the horizontal).

(c) Where the distance from the ground level to the eaves is more than 7 metres and the pitch of the roof is more than 1 in 1 (i.e. the included angle at the apex of the roof is less than 90°).

Under these circumstances eaves conductors need not be installed.

Any non-metallic objects which protrude above the general roof lines, such as Cape Dutch gable ends, must be protected as described above with a suitable air terminal system. Any metallic objects which protrude above the general roof line, such as hot water expansion pipes must be bonded as directly as possible to the nearest eaves conductor, gutter or other part of the lightning system.

N.B. : These bonding conductors must run in a horizontal or preferably a downward direction, from the vent pipe, etc., to the lightning protection system.

5.2 Air Terminals for Metallic Pitched Roofs

Buildings with roofs covered with electrically continuous metal sheets do not require separate air terminals but must be earthed via down conductors generally as described in 5.6 and 5.7. Any non-metallic objects projecting above the general roof line must be separately protected as described in 5.1 and bonded to the metal roof covering.

5.3 Air Terminals for Non-metallic flat or Mono-pitched Roofs

For flat or mono pitched roofs of non-metallic construction the air terminal system must consist of aluminium alloy conductors installed around the outer perimeter of each section of the roof structure. These conductors must be installed on top of parapet walls if these exist. Lift motor rooms, tank rooms, penthouses, etc., which protrude above the general roof line must have air terminal conductors installed around the outer perimeter of each roof slab or parapet wall. Any metallic objects which protrude above the roof line, such as expansion pipes, signs, flag poles, handrails, etc., must be bonded directly to the nearest component of the lightning protection system as described in 5.1.

N.B. : It is not permissible for the ends of conductors to be bonded directly to the perimeter air terminal system if the latter is installed upon a parapet wall having a height exceeding 500 mm above roof slab level. In these circumstances the conductors are to be bonded directly to the down conductors.

5.4 Air Terminals for Metallic flat or Mono Pitched Roofs

Metallic flat or mono pitched roofs do not require separate air terminal conductors, providing that there is electrical continuity between the metallic roofing sheets, (see 5.2). A metallic roof surrounded by a non-metallic parapet wall shall have conductors installed at the top of the parapet wall and these must be bonded to the metallic roof at intervals not exceeding 20 metres. If the parapet wall is clad with metal over its upper surface or a handrail is installed which affords good electrical continuity, separate air terminal conductors need not be installed. Under these circumstances the metal handrail or cladding must be bonded to the metal roof covering at intervals not exceeding 20 metres.

All non-metallic covering such as slates, tiles, asbestos cement sheeting, etc., supported by a steel structure being electrically continuous throughout may be treated as being of a complete metal construction. In these circumstances no separate air terminal system need be installed providing the steel roof structure is bonded to earth at intervals given in 5.5.

5.5 Down Conductors for Non-metallic Structures

Down conductors must be installed at regular intervals around structures and to run as directly as possible between the air terminal and earthing system. They must, where practicable, be positioned at the external corners of the structure. The maximum separating distance between down conductors around the perimeter of the structure must not exceed 30 metres. In the case of very tall buildings having a slender base (i.e. chimney stacks, water towers, etc.), a minimum of two down conductors must be installed.

The lower ends of down conductors are to be terminated and bonded to the earthing system approximately 200 mm above finished ground level. Under no circumstances must aluminium conductors be buried underground. Test joints must be provided between the down conductors and earthing system. Down conductors must run vertically between the air terminal and earthing systems. Where this is impracticable, their course may be deviated to run at any angle up to and including horizontal.

Where it is necessary to run conductors horizontally over the upper surface of a structural protrusion, such as an exposed concrete slab, the conductor may run down vertically over the edge of the slab and return to the main structure, so that the distance between the upper and lower conductors exceeds one third of the length of the horizontal run. Looped down conductors are not permitted. Down conductors must not run over the underside of large overhangs which are less than 6 metres above ground level, or other areas where people are likely to be present during a thunderstorm.

External or internal metallic rainwater pipes may be used as down conductors providing these are of substantial section and are jointed by screwing one length into another or welding. Thin gauge galvanized steel pipes whose sections are held together by friction, rivets or screws must not form part of a lightning protection system.

5.6 Down conductors for reinforced concrete framed structures

The steel reinforcement of this type of structure may be used in place of down conductors. Where the reinforcing system is used, the air terminal system must be bonded to it at a maximum of 30 metre intervals using steel clamps. This bond may be achieved by clamping, with a steel clamp, a steel conductor to a selected reinforcing bar, the opposite end of this conductor must terminate at a corrosion resistant metallic terminal such as Grade 316 stainless steel.

The reinforcing system of prefabricated concrete buildings must not be used unless special provision is made for bonding the various prefabricated sections together.

The terminals should be mounted flush with the face of the concrete. An aluminium alloy bond must then be taken from the air terminal system and be connected to the stainless steel terminal by means of a heavily tinned crimp lug for circular section aluminium, or a suitable bi-metallic joint in the case of flat section aluminium. A similar system must be used to bond the reinforcing system at ground level to the earthing system at points directly below the air terminal bonds. Here copper conductors must be used as the external bonding material.

Under no circumstances must copper, or other non-ferrous material be allowed to come into contact with steel reinforcing bars, as this may cause severe corrosion and subsequent structural damage. The lightning protection system must not be bonded to any part of the structure which is electrically isolated from the remainder of the building, i.e. cantilevered sections. In these circumstances, or where it is otherwise impracticable to use the reinforcing system, external down conductors must be installed as described in 5.5.

5.7 Down conductors for steel framed structures

Where the framework of a building is constructed of structural steel columns, these may be used in place of down conductors providing the separating distance between them does not exceed 30 metres. The upper ends of the columns must be bonded to the air terminal systems and the lower ends to the earthing system.

5.8 Earthing by means of vertically installed rod type electrodes

Rod-type electrodes must be driven into the ground at a position directly below each down connector. The maximum earthing resistance of each electrode or number of electrodes bonded to any one down conductor shall not exceed N X 30 ohms, where N equals the total number of down conductors which are bonded to a common air terminal system, or 200 ohms whichever is the lower value.

The minimum horizontal separating distance between rod-type electrodes bonded together must not be less than their installed depth. The upper ends of installed rod-type electrodes are to be terminated approximately 500 mm below finished surface level. A 50 mm^2 copper bonding conductor must be installed to run between each earthing electrode system and the lower ends of the adjacent down conductors. A joint is to be made between each of these bonding conductors and the down conductors at a position approximately 200 mm above finished ground level. These bonding conductors must be installed in P.V.C. conduit securely affixed to the wall (see 3.4). The length of this P.V.C. conduit must be approximately 600 mm and must be installed so that approximately 200 mm protrudes above ground level, the remainder being buried into the soil.

5.9 Earthing by means of metallic water mains

Where two or three down conductors are installed the water mains may serve as an earth terminal for one of these. Where three of more down conductors are installed the water mains may serve as an earth terminal for two of these. Regardless of whether the water mains are used as an earth terminal or not, the incoming metal water pipe must be bonded to the lightning protection earthing system underground.

5.10 Earthing by means of trench type electrodes

Where the soil conditions prevent the satisfactory installation of rod-type electrodes, a trench earth system must be installed. This method is to comprise a 50 mm^2 stranded copper conductor installed horizontally into a trench at a depth of 500 mm below finished ground level. The conductor is to follow the general outline of the structure to be protected and be installed 1 metre away from the outside walls. Where the building stands on rocky ground, the trench earth may be attached to the lower part of the wall in areas where rock protrudes through the soil. The conductor must, however, be buried wherever possible as described above.

Each down conductor must be bonded to the trench earth system as directly as possible by means of a copper conductor.

Trench earth systems must have a maximum earth resistance of 30 ohms. An isolated length of trench earth mat must be bonded to the down conductor system in such a way as to reduce the length of dead-ends to the minimum.

Should trench earths be installed beneath pathways where people are likely to be present during a thunderstorm, a plastic, bitumastic or ceramic pipe must be installed having a length similar to the width of the pathway and the trench earth conductor run inside it.

N.B. : The maximum useful length of a dead-ended trench earth is 80 metres.

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ANNEXURE 4

MAP OF BID SUBMISSION LOCATION


PIETERMARITZBURG
Mcdonald's
(Pietermaritzburg)
Church St
Burger St
Prince Alfred St
Bulwer St
Boshoff St
Aberfeldy Rd
West St
1st Ave
Scott St
Pine St
Park Dr
Payn St
Mediclinic
Pietermaritzburg
Riverton Rd
Woodhouse Rd
Survey Rd
Balmoral Dr
Princess Elizabeth Dr
Princess Margaret Dr
Leinster Rd
Alan Paton Ave
College Rd
SCOTTSVILLE
N
DOPW - Head Office
Tender Box Location
191 Prince Alfred street
Pietermaritzburg
DOPW Southern Region-
Tender Box Location
10 Prince Alfred street
Pietermaritzburg

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PUBLIC WORKS
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DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 5

JOINT VENTURE AGREEMENT

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

Joint Venture Agreement
(March 2004)
(First Edition of CIDB document 1017)

1. **PREAMBLE**

This agreement is made and entered into by and between

_____

_____

_____

of the first part and

_____

_____

_____

of the second part and

_____

_____

_____

of the third part.

(allow for additional parties as necessary).

Whereas the foregoing parties have resolved to form a Joint Venture under the title of

_____

_____

_____

for the exclusive purposes of securing and/or executing the Contract to be awarded by

(name of Employer)

to the KZN Department of Public Works in respect of the following project:

for *(brief description of Contract)*

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

Now it is hereby agreed as follows :

2. DEFINITIONS AND INTERPRETATION

2.1 Definitions

The following words and expressions shall have the meanings indicated, except where the context otherwise requires. Defined terms and words are, in general, signified in the text of the Agreement by the use of capital initial letters, but the absence of such letters does not necessarily signify that a term, or word, is not defined.

'Agreement' means the agreement between the Members of the Joint Venture and includes this model form of agreement together with the Preamble, Specific Provisions, if any, Schedules 'A', 'B' and 'C' and any relevant Documents prepared prior to the signing of the Agreement and appended thereto.

'Contract' means the contract with the Employer for the supply of the Deliverables, for the purposes of securing and executing which, the Joint Venture has been formed.

'Deliverables' means the works and/or services, equipment, materials, goods, etc. to be furnished by the Joint Venture to the Employer in terms of the Contract.

'Document' means any written, drawn, typed, printed, or photographic material, which relates to the Agreement.

'Employer' means the person, or body, which is to award the Contract and will employ the Joint Venture if it is awarded the Contract.

'Joint Venture' means the joint venture formed by the Members in accordance with the Agreement.

'Management Committee' means the body established in terms of the Agreement to manage all aspects of the work of the Joint Venture in securing and executing the Contract and in meeting the provisions for the Agreement.

'Member' means a person, or body which, being a party to the Agreement, is a member of the Joint Venture.

'Member's Interest' means the proportion expressed as a percentage, which the total monetary value of all resources provided and contributions made by a Member towards the execution by the Joint Venture of the Contract bears to the total of such values by all Members and, unless otherwise indicated in the Agreement, represents the extent to which the Member participates in the fortunes of the Joint Venture.

'Representative' means the person representing a Member on the Management Committee.

'Schedules' means Schedules 'A', 'B' and 'C' which set out general, financial and other information relating to the Members and the obligations, duties, rights, risks and benefits arising from their participation in the Joint Venture.

'Specific Provisions' means the variations, if any, required to this standard form of agreement for the specific purposes of the Agreement.

2.2 Interpretation

Unless inconsistent with the context, an expression in the Agreement which denotes:

- any gender shall include the other genders
- a natural person shall include a juristic person and vice versa
- the singular shall include the plural and vice versa

2.3 Headings

The headings to clauses of the Agreement shall not be considered part thereof, nor shall the words they contain be taken into account in the interpretation of any clause.

2.4 Law

The Agreement shall be construed in accordance with and governed by the laws of the Republic of South Africa and the English language versions shall prevail.

2.5 Language

English shall be exclusively used by the Members in the preparation of Documents unless otherwise indicated.

2.6 Conflict between Agreement and Contract

Should any provision of the Agreement be in conflict with the terms of the Contract, the Agreement shall be amended to the approval of the Management Committee so as to eliminate the conflict.

3. JOINT VENTURE GENERAL

3.1 Establishment and Purpose

The Joint Venture established by the Members in terms of the Agreement is an unincorporated association with the exclusive purposes of securing and executing the Contract for the benefit of the Members.

3.2 Termination

The operation of the Joint Venture and the validity of the Agreement shall terminate if and when it becomes evident that the Joint Venture will not be awarded the Contract, or, if the Joint Venture secures the Contract, when all obligations and rights of the Joint Venture and the Members in connection with the Contract and the Agreement have ceased and/or been satisfactorily discharged.

Unless otherwise decided by the Management Committee, the Agreement shall not terminate if a Member changes its name, or is taken over by, or merged with, another body.

This agreement will terminate when any one of the Members resigns, are liquidated or opts out of this agreement and the Joint Venture will be in breach of contract with the Employer and their contract could be cancelled.

3.3 Exclusivity

Unless otherwise agreed by the Management Committee, or provided for in the Contract no Member shall engage in any activity related to the Contract other than as a Member of the Joint Venture and Members shall ensure that their subsidiaries and other bodies over which they have control comply with this requirement.

3.4 Participation of Members

Except as may otherwise be stipulated in the Agreement, each Member shall be responsible for all costs incurred by it prior to the date of inception of the Agreement.

Subsequent to the date of inception of the Agreement, each Member shall, participate in the operations, risks, responsibilities and fortunes of the Joint Venture including, inter alia, the provision of funding, sureties, guarantees, insurances, human and other resources and participation in profits and losses to the extents indicated in the Schedules. Participation in any aspect not covered in the Schedules shall, if an agreement cannot be reached between the Members, be to the same extents as indicated by the Members Interests.

3.5 Management

The affairs of the Joint Venture shall be directed and controlled by the Management Committee, as set out in Section 4 hereof.

3.6 Confidentiality

All matters relating to the Agreement and the Contract shall be treated by the Members as confidential and no such matter shall be disclosed to any third party without the prior written approval of the Management Committee.

No Member shall be party to the dissemination of publicity relating to the Contract, or the Agreement, without the prior written approval of the Management Committee and the Employer.

3.7 Assignment

No Member shall cede, assign, or in any other way make over any of its rights, or obligations, under the Agreement without the prior written consent of the Management Committee.

3.8 Subcontracting

No Member shall subcontract any obligation, work or duty for which it is, itself, responsible in terms of the Agreement without the prior written consent of the Management Committee.

3.9 Variations to Agreement

No variation, modification, or waiver of any part of the Agreement shall be of any force, or effect, unless unanimously agreed by the Members and reduced to writing.

3.10 Liability

Each Member warrants that it will indemnify the other Members against all legal liabilities arising out of, or in connection with the performance of its obligations under the Agreement.

It is acknowledged by the Members that they may be held jointly and severally liable in respect of claims against the Joint Venture by the Employer or third parties.

4. MANAGEMENT OF JOINT VENTURE

4.1 General

The affairs of the Joint Venture shall be directed, controlled and managed by the Management Committee, which, within the terms of the Agreement and the Contract, shall have full authority to bind the Members in all matters relating to the affairs of the Joint Venture.

Communication between the Joint Venture and the Employer, or third parties, relating to the Contract shall be conducted exclusively by the Management Committee, or by such person as it may delegate to perform this function.

The Management Committee shall have the power to appoint a project manager and/or such other persons as it may see fit to appoint for the purpose of executing the Contract and may delegate such of its powers, responsibilities and duties as it may consider necessary, or desirable, to persons or bodies appointed or seconded for this purpose.

Such administrative functions as are necessary to ensure the effective operation of the Management Committee shall be performed by its chairman.

4.2 Management Committee

4.2.1 *Composition*

The Management Committee shall, unless otherwise agreed by all the Members, consist of one Representative of each Member and each Member shall be obliged, at all times, to maintain a Representative on the Management Committee.

Each member shall, not later than three working days after the signing of the Agreement, appoint its Representative and notify the other Members of the name and contact details of the Representative. Such Representative shall have the power to bind the Member that he represents in all matters relating to the execution of the Contract and the performance of the Agreement.

A Member shall be entitled, after giving the other Members not less than three working days written notice of his intention to do so, appoint, remove and/or replace, an alternate who shall, at any meeting of the Management Committee from which the Representative whom he represents is absent, be vested with all rights and powers and subjected to all the obligations of the absent Representative.

The chairman of the Management Committee shall be the Representative of the Member which has the largest Member's Interest. If two, or more, Members have the same, largest Member's Interest, the chairmanship shall rotate between the Representatives of such Members at three monthly intervals, the order of rotation to be determined by ballot.

Notwithstanding the foregoing, the chairmanship of the Management Committee may be determined, or changed, at any time by unanimous decision of the Management Committee.

No remuneration shall be paid by the Joint Venture to Representatives or their alternates for serving on the Management Committee,

4.2.2 *Meetings*

Meetings of the Management Committee shall take place at such times and places as the Management Committee may determine, provided that the chairman shall convene a meeting of the Management Committee to be held not later than ten working days after he has been requested, in writing, by a Member to do so. Not less than five working days written notice of any meeting of the Management Committee shall be given to all Representatives and their alternates.

The Management Committee may permit, or invite, persons other than Representatives or alternates to attend any of its meetings, but such persons shall not have voting rights.

4.2.3 *Decisions*

Each Representative shall have one vote on the Management Committee and where, in terms of this clause, a casting vote is required, this shall be exercised by the chairman.

All decisions of the Management Committee shall, desirably, be unanimous. Accordingly, if unanimity cannot, initially, be achieved in regard to a decision, the meeting at which that decision is sought shall be adjourned for a period of 48 hours to enable Representatives to consult with their principals. If, on resumption of the adjourned meeting, unanimity can still not be achieved, the decision, provided it is not one requiring unanimity of the Members, shall be taken by majority vote and, in the event of a tie, the chairman shall exercise a casting vote.

A Member not satisfied with a majority decision of the Management Committee may declare a dispute, to be dealt with in terms of Clause 8 hereof, but the majority decision shall, nevertheless, be implemented with immediate effect.

Decisions of the Management Committee, whether taken at a meeting, or otherwise, shall be recorded in written minutes, which shall be distributed by the chairman to reach the Representatives not later than five working days after those decisions were taken. Such minutes shall be deemed to have been affirmed by the Representatives unless written notice of dissent is received by the chairman not later than three working days after receipt of the minutes by the Representative.

4.2.4 Powers and duties

The functions, responsibilities and powers of the Management Committee shall include, inter alia, those listed below:

4.2.4.1 Formulating overall policy in regard to the achievement of the objectives of the Joint Venture.

4.2.4.2 Managing the day to day affairs of the Joint Venture.

4.2.4.3 Monitoring, directing and co-ordinating the activities of the Members to ensure that the objectives of the Joint Venture are achieved and that the obligations and responsibilities of the individual Members are met.

4.2.4.4 Monitoring and controlling the financial affairs of the Joint Venture and ensuring that proper books of account and financial records relating to affairs of the Joint Venture are maintained in an approved form and submitted to the Management Committee for approval at regular intervals, which shall not be longer than one month.

4.2.4.5 Determining the necessity for and the details of any changes in the duties and responsibilities of Members provided that any resulting changes in Members' Interests shall be unanimously approved by the Members.

4.2.4.6 Determining the terms and conditions of employment of personnel and the emoluments applicable to staff seconded to the Joint Venture by the Members.

4.2.4.7 Controlling and approving the appointment of all subcontractors.

4.2.4.8 Procuring, after the completion of the Contract and the release of all bonds, guarantees and sureties given in respect of the performances of the Joint Venture and the Members, the preparation and auditing of a final set of accounts, on the basis of which the final profits, or losses, attributable to the individual Members shall be determined and any necessary adjustments effected.

5 RESOURCES OF JOINT VENTURE

The resources to be utilised by the Joint Venture in securing and executing the Contract shall, insofar as these are to be provided directly by the Members, be as set out in the Schedules and may, from time to time, be amended by decision of the Management Committee, provided that the Member's Interests are not, except with the unanimous approval of the Members, affected thereby.

Similarly, specific areas of responsibility of the Members for the performance of work and the provision of facilities shall be as set out in the Schedules and may, from time to time, be amended by decision of the Management Committee, provided that the Members' Interest are not, except with the unanimous approval of the Members, affected thereby.

5.1 Schedule 'A' (General)
Schedule 'A' shall contain general information relating to the Joint Venture including, inter alia, the following :

1. The Employer's name and address.
2. A brief description of the Contract and the Deliverables.
3. The name, physical address, communications addresses and domicilium citandi et executandi of each Member and of the Joint Venture.
4. The Members' Interests.
5. A statement indicating whether, or not, Specific Provisions apply to the Agreement.
6. A schedule of insurance policies which must be taken out by the Joint Venture and by the individual Members.
7. A Schedule of sureties, indemnities and guarantees that must be furnished by the Joint Venture and by the individual Members.
8. Details of the persons, who, in the event of failure by the Members to reach agreement on the appointments of mediator and arbitrator, will nominate appointees to these positions in terms of Clauses 8.2 and 8.3.

5.2 Schedule 'B' (Financial)
Schedule 'B' shall contain information regarding the financial affairs of the Joint Venture including, inter alia, the following :

1. The working capital required by the Joint Venture and the extent to which and manner whereby this will be provided and/or guaranteed by the individual Members from time to time.
2. The banking accounts that are to be opened in the name of the Joint Venture and the manner in which these are to be operated.
3. The rates of interest that will be applicable to amounts by which Members are in debit, or credit, to the Joint Venture.
4. The names of the auditors and others, if any, who will provide auditing and accounting services to the Joint Venture.
5. The intervals at which interim financial accounts and forecasts will be prepared for approval by the Management Committee.
6. Insofar as not covered in Schedule 'C', the basis on which contributions of various types by the Members towards the work of the Joint Venture in securing, executing, managing and satisfactorily completing the Contract, will be valued.
7. The basis on which profits and/or surplus cash will, if available from time to time, be distributed to Members.
8. The basis upon which losses, if any, are to be apportioned to Members.

5.3 Schedule 'C' (Contributions by Members)
Schedule 'C' shall set out the contributions of various types, other than cash, that will be made by the individual Members towards the work and obligations of the Joint Venture and shall, as far as possible, indicate the monetary values to be placed on such contributions, which may include, inter alia, the following :

1. Staff seconded to the Joint Venture.
2. Work carried out and services provided to, or on behalf of, the Joint Venture.
3. Plant, equipment, facilities etc. made available for use by the Joint Venture.
4. Materials and goods supplied to, or on behalf of, the Joint Venture.
5. Licences, sureties, guarantees and indemnities furnished to, or on behalf of, the Joint Venture.
6. Joint Venture Disclosure form required for the Contract.

6. BREACH OF AGREEMENT

If a Member breaches any material provision of the Agreement, or delays or fails to fulfil its obligations in whole, or in part, and does not remedy the situation within fourteen calendar days of receipt of notice from the Management Committee, or another Member, to do so, the other Members shall have the right, without prejudice to any other rights arising from the default, to summarily terminate the Agreement and re-assign the defaulting Member's rights and obligations in the Joint Venture as they see fit and withhold any moneys due to the defaulting member by the Joint Venture.

Each Member shall indemnify the other Members against all losses, costs and claims which may arise against them in the event of the Agreement being terminated as a result of breach of the Agreement by the said Member.

7. INSOLVENCY OF MEMBER

Should a Member be placed in liquidation, or under judicial management, whether provisionally or finally, or propose any compromise with its creditors, the other Members shall be entitled to proceed in terms of Clause 6, as if the Member had breached the Agreement.

8. DISPUTES

8.1 Settlement

The Members shall negotiate in good faith and make every effort to settle any dispute, or claim, that may arise out of, or relate to, the Agreement.

If agreement cannot be reached, an aggrieved Member shall, if he intends to proceed further in terms of Clause 8.2 hereof, advise all other Members in writing that negotiations have failed and that he intends to refer the matter to mediation in terms of Clause 8.2.

8.2 Mediation

Not earlier than ten working days after having advised the other Members, in terms of Clause 8.1, that negotiations in regard to a dispute have failed, an aggrieved Member may require that the dispute be referred, without legal representation, to mediation by a single mediator.

The mediator shall be selected by agreement between the Members, or, failing such agreement, by the person named for this purpose in Schedule 'A'. The costs of the mediation shall be borne equally by all Members.

The mediator shall convene a hearing of the Members and may hold separate discussions with any Member and shall assist the Members in reaching a mutually acceptable settlement of their differences through means of reconciliation, interpretation, clarification, suggestion and advice. The Members shall record such agreement in writing and thereafter they shall be bound by such agreement.

The mediator is authorised to end the mediation process whenever in his opinion further efforts at mediation would not contribute to a resolution of the dispute between the Members.

8.3 Arbitration

Where a dispute or claim is not resolved by mediation, it shall be referred to arbitration by a single arbitrator to be selected by agreement between the Members or, failing agreement, to be nominated by the person named for this purpose in Schedule 'A'.

The Member requiring referral to arbitration shall notify the other Members, in writing, thereof, not later than thirty calendar days after the mediator has expressed his opinion, failing which the mediator's opinion shall be deemed to have been accepted by all Members and shall be put into effect.

Arbitration shall be conducted in accordance with the provisions of the Arbitration Act No. 42 of 1965, as amended, and in accordance with such procedure as may be agreed by the Members or, failing such agreement, in accordance with the rules for the Conduct of Arbitrations published by the Association of Arbitrators and current at the date that the arbitrator is appointed.

The decisions of the arbitrator shall be final and binding on the Members, shall be carried into immediate effect and, if necessary, be made an order of any court of competent jurisdiction.

9. DOMICILIUM

The Members choose domicilium citandi et executandi for all purposes of and in connection with the Agreement as stated in Schedule 'A'. A Member shall be entitled to change his domicilium from time to time, but such change shall be effective only on receipt of written notice of the change by all other Members.

Member No. 1

Thus done and signed at _____ this _____ day of _____ 20___

For and on behalf of _____ *[Company]*

by *[name]* _____ who warrants his authority to do so.

_____

As witnesses 1. _____ As witnesses 2. _____

Member No. 2

Thus done and signed at _____ this _____ day of _____ 20___

For and on behalf of _____ *[Company]*

by *[name]* _____ who warrants his authority to do so.

_____

As witnesses 1. _____ As witnesses 2. _____

Member No. 3

Thus done and signed at _____ this _____ day of _____ 20___

For and on behalf of _____ *[Company]*

by *[name]* _____ who warrants his authority to do so.

_____

As witnesses 1. _____ As witnesses 2. _____

[Allow for additional parties as necessary].

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 6

PROJECT SPECIFIC HEALTH AND SAFETY SPECIFICATION

REFERENCE NR	075988
Revision	00
Date	28 February 2022

28 February 2022

public works

Department:
Public Works
PROVINCE OF KWAZULU-NATAL

Occupational Health and Safety Specification

(OHSE SPEC)

Project Name: Department of Health: ST Andrews Hospital

WIMS no.: 075988

Agent Name: K.R Mncwabe

Region: Southern Region

District: UMgungundlovu District

Ward no.:

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1. Introduction

The *KwaZulu Natal Department of Public Works* is deemed as the **"Client"** in terms of the definitions of Construction Regulations of 2014 as published in *Government Gazette No. 37305.*The Construction Regulations of 2014 under *CR(5)(1)* stipulates that that the client must prepare a suitable, sufficiently documented and coherent site specific Occupational Health and Safety Specification for the intended construction work based on the baseline risk assessment.

The purpose of this Occupational Health and Safety Specification document (which hereinafter will be referred to as OHSE Spec) is to provide designers and the successful tenderer with essential OHS information to ensure effective safety management during the design and construction phase of the project.

This OHSE Spec forms an integral part of the contract between the Client and the Principal Contractor, so as to ensure compliance with the Occupational Health and Safety Act, Act 85 of 1993 and its applicable regulations and must serve as the basis for the Principal Contractor to develop his/her Project Safety, Health and Environmental Management Plan. As with any other plan for it to be implemented and managed effectively it requires the allocation of sufficient funds to achieve the objectives set out in the plan. In line with this requirement Construction Regulation 5(1)(g) requires the Client to ensure that the Principal Contractor has made adequate provisions for the cost of Health and Safety Measures in their tenders.

It must be noted that this OHSE Spec as much as it is detailed it is not exhaustive and the onus is on the Principal Contractors to ensure that they comply with Section 8 of the OHS Act, Act 85 of 1993 which states that "*Every Employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees.*" this means that Principal Contractors as they are employers in their own right must at all times ensure continuous assessments are done for continued provision and maintenance of a healthy and safe working environment.

2. Definitions

For the purpose of the OHSE Spec, the abbreviations or definitions given hereunder shall apply and the reference to on gender will also apply to the other gender.

"CR" refers to the Construction Regulations 2014

"Agent (*Pr.CHSA*)" means a competent person who acts as a representative for a Client in terms of regulation (5)5.

" AIA" means An approved inspection authority involved in type 2 or type 3 asbestos work.

"Client" means Department of Public Works.

"Competent person" means a person who-

(a) Has in respect of the work or task to be performed the required knowledge, training and experience and, where applicable, qualifications, specific for that work or task: Provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualifications Framework Act, 2000 (Act No.67 of 2000), those qualifications and that training must be regarded as the required qualifications and training; and

(b) Is familiar with the OHS Act, Act 85 of 1993 and with the applicable regulations made under the Act;

"Construction Manager (*Site Agent*)" means a competent person responsible for the management of the physical construction processes and the coordination, administration and management of resources on a construction site;

"Construction Site" means a work place where construction work is being performed;

"Construction Supervisor" means a competent person responsible for supervising construction activities on a construction site;

"Construction Vehicle" means a vehicle used as a means of conveyance for transporting persons or material, or persons and material, on and off the construction site for the purposes of performing construction work;

"Construction work" means any work in connection with –

(a) The construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure; or
(b) the construction, erection, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system; or the moving of earth, clearing of land, the making of excavation, piling, or any similar civil engineering structure or type of work;

"Construction Work Permit" means a document issued in terms of regulation 3 of the Construction Regulations 2014;

"Contractor" means an employer who performs construction work;

"Demolition Work" means a method to dismantle, wreck, break, pull down or knock down of a structure or part thereof by way of manual labour, machinery, or the use of explosives; ·

"Fall Protection Plan" means a documented plan, which includes and provides for-
(a) All risks relating to working from a fall risk position, considering the nature of work undertaken;
(b) The procedures and methods to be applied in order to eliminate the risk of falling; and
(c) A rescue plan and procedures;

"Health and Safety File" means a file, or other record containing the information in writing required by these Regulations;

"Health and Safety Plan" means a site, activity or project specific documented plan in accordance with the client's health and safety specification;

"Health and Safety Specification" means a site, activity or project specific document prepared by the client pertaining to all health and safety requirements related to construction work;

"Medical Certificate of Fitness" means a certificate contemplated in regulation 7(8) of Construction Regulations 2014;

"Principal Contractor" means an employer appointed by the client to perform construction work;

"Safety Officer" – a person deemed competent by SACPCMP under the relevant category of registration.

"Professional Engineer or Professional Certificated Engineer" means a person holding registration as either a Professional Engineer or Professional Certificated Engineer in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000);

3. Scope of Application

This OHSE Specification document stipulates the minimum Occupational Health, Safety, and Environmental requirements that the tenderer need to address in his/her OHSE Plan. This Specification also addresses legal compliance, hazard identification, risk assessment, risk control, and the promotion of a Health and Safety culture amongst those working on the project.

This Specification also makes provision for the protection of persons other than employees. This OHSE Spec is exclusively applicable to the following project pending any change of scope which may necessitate changes to the OHSE Specification;

Department of health: ST Andrews Hospital

This OHSE Specification further seeks to achieve the following;

a) To provide Principal Contractors with the Structure of the Detailed OHSE Plans they will have to prepare and submit for this project. ***See Annexure A***

b) Provide the overarching framework within which the Principal Contractor is required to demonstrate compliance with certain requirements for occupational health and safety established by the Occupational Health and Safety Act, Act 85 of 1993, all applicable regulations and Client Specific Requirements. ***See Annexure B***

c) To bring to the attention of the Bidding Principal Contractors that they need to make an undertaking that the costs for executing the project includes the costs of complying with the OHS Act, Act 85 of 1993, all applicable regulations including Client Specific requirements. Such undertaking is made by appending signatures on the OHS Declaration for Tenders. ***See Annexure C***

d) Ensure that the Principal Agent as the Professional Service Provider appointed by the Department to manage the project on its behalf in terms of the Conditions of Contract applicable to this project ensures that the contents of this document and the attached Baseline Risk Assessment are taken into consideration during design by all professions appointed and that the OHSE Specification is incorporated into the tender documents. ***See Annexure D***

3.1. Site location

The site is located in Harding.

3.2. Summary of Scope of work

- Asbestos removal
- Installation of Cromadek roof sheets and side cladding.
- Removal and installation of new ceilings.
- Electrical works.

3.3 COVID-19 GUIDLELINES

The principal contractor shall ensure that there is a full compliance to COVID-19 management in minimizing the risk of exposure of workers and visitors on site under disaster management act 57 0f 2002 in terms of the following items:

- COVID-19 OHS policy statement.
- Introduction and definition of a COVID-19 virus.
- Authority and responsibility.
- Appointment of a COVID-19 manager(s)
- Risk management under COVID-19

- Training and awareness programme.
- Personal health and hygiene.
- Worksite COVID-19 transmission and viral spread prevention.
- Social distancing 1.5 Metres apart each other.
- Daily screening using COVID-19 signs and symptoms.
- Tracing of exposed people in the event of a confirmed positive case.
- Isolation procedure.
- Cleaning and disinfection of areas of concern.
- Methodology of cleaning and sanitization of facilities, tools and equipment on site.
- Supply of personal protective equipment (PPE) to workers and visitors.
- Supply of hygiene consumables e.g. water, soap and sanitizer
- Access control to minimize risk of exposure.
- Disposal of used PPE to prevent COVID-19.
- Signage

4. Contractual Issues

Acceptance by the Principal Contractor of the contract with KZN DOPW shall constitute acknowledgement that the Principal Contractor has familiarised him/herself with the contents of the OHSE Spec and that he/she will comply with all its obligations in respect thereof.

Due to fact that this document is based on legislative requirements, the Client requires that all Contractors comply with the requirements of this document and all other relevant legislative requirements not covered by this document.

The Client or its duly appointed Construction H&S Agent reserves the right to stop any Principal Contractor or Sub-Contractors from working whenever Safety, Health or Environmental requirements are being violated as required by regulation 5(1)(q). Any resultant costs of such work stoppages will be for the relevant Contractor's account.

The requirements as specified by the Client in this document must not be deemed to be exhaustive and the Client reserves the right to make changes as and when the Client deems fit to address issue of OHSE Compliance.

The Client will not entertain any claim of any nature whatsoever which arises as a result of costs incurred or delays being experienced due to the Contractor not complying with the requirements of this document and/or any other applicable legislative requirements imposed on the Contractor.

5. Administrative Requirements

5.1 Notification of Construction Work

The Contractor shall submit to the Department of Employment and Labour Annexure of Notification of intention to commence construction work. At the time of submitting its SHE Plan for evaluation and supply proof of such submission to the Departmental SHE Representative whom will only issue letter of SHE Plan Approval and Appointment as stipulated by CR5(1)(k) upon receipt of such submission.

5.2 Notification of Asbestos Work

The Contractor shall submit to the Department of Employment and Labour Annexure of Notification of intention to commence asbestos work. At the time of submitting its SHE Plan for evaluation and supply proof of such submission to the Departmental SHE Representative whom will only issue letter of SHE Plan Approval and Appointment as stipulated by CR5(1)(k) upon receipt of such submission.

6. (I)Appointment of a Fulltime Construction H&S Officer (II) Appointment of(AIA) approved inspection authorities for asbestos work

I. The Principal Contractors will have to appoint a competent fulltime Construction H&S Officer. Before commencing work, the Contractor shall designate a competent SACPCMP registered Health and Safety officer on full time basis. The Principal Contractor shall provide the Departmental Health and Safety representative on this project with certificate of competency and Curriculum Vitae of the Health and Safety Officer. The Health and Safety Officer will be expected to attend the Site progress meetings.

II. Approved inspection authorities for asbestos work shall be appointed to ensure that all type 2 or type 3 asbestos activities are carried out under adequate compliance, either by a principal agent or be a Principal contractor under special provisions or terms and conditions.

7. COVID-19 Site Management Safety Requirements

Every employer (contractor) has an obligation to assist government in enabling contact tracing in the workplace. These obligation include the following measure:

- Contractors are advice to observe confidentiality of employee's details and medical results at all times.
- A register containing the details of employees, visitors and service providers that enter the site in a particular day to be kept in a secured environment only accessible to authorised personnel.
- The following details should be contained in the register, date, time (of entry and departure), name, surname, identity number, residential address, and mobile number and next of kin details.
- All employees, service providers, sub-contractors, visitors and consultants must sign the register with the above details on entering the site.
- Adequately trained health and safety personnel, to perform daily workplace COVID-19 symptom screening. Provide compulsory medical screening equipment.
- Provide prescribed personal protective equipment (PPE) to all employees onsite. All personnel and visitor entering the site must be temperature screened with a laser temperature scanner and records must be kept of the site register.
- If the temperature is above 37.3° C or more, advice the individual to stay at home, self-isolate, and observe the symptoms.
  - There should also telephone the nearest health facility or the COVID-19 centre; provide them details of their recent travel and symptom.

Annexure A

Structure of the Detailed OHSE Plan

A detailed SHE Plan needs to be submitted by the successful tenderer as per section 8 above. The following are the minimum standard legal documentation that must form part of the OHSE Plan based on the risks attached in executing this project –

Department of health: ST Andrews hospital

1. The notification to commence with construction work made to the Provincial Director of Labour using Annexure 2. (*Filled in only to be submitted on approval of the Safety Plan*)
2. Letter of Good Standing with Compensation Commissioner or Compensation insurer
3. The Contractor's Health, Safety & Environmental Policy, signed by the chief executive officer, which outlines the Contractor's OHSE compliance objectives and how they will be achieved. The contractors Covid-19 Management Plan indicating how Covid-19 would be managed, based on this specification and the Contractors Issue Based Risk Assessment regarding Covid-19
4. Pre-Construction risk assessment *(Site specific)* and method statement of priority Risk as per the Risk Profile.
5. Relevant checklists and registers.
6. Site specific OHSE Organogram
7. Preliminary Induction Program
8. Environmental Management Plan
9. Public Safety Management Plan
10. Proof of competency for the following legal appointees;

10.1. Construction Manager – (Detailed CV reflecting qualification, relevant experience and references from previous clients)
10.2. Construction Work Supervisor – (Detailed CV reflecting qualification, relevant experience and references from previous clients)
10.3. Construction H&S Officer – SACPCMP proof of registration
10.4. Risk Assessor – HIRA Certificate or Equivalent
10.5. Accident Investigator – RCAT (Root Cause Analysis Technique) or equivalent
10.6. Fall Protection Planner – SAQA US 229994
10.7. Demolition work inspector – (Detailed CV reflecting qualification, relevant experience and references from previous clients)
10.8. Electrician – wireman's licence

Legal appointments to be appointed	
Prior Site Handover	**After Site Handover on commencement with Construction work**
• Section 16(1) CEO • Section 16(2) assistant CEO/ • Construction Manager CR 8(1) & Competency. *Detailed CV reflecting qualification, Valid Supervisor Certificate, relevant experience and references from previous clients* • Construction Work Supervisor & CR 8(7) Competency, *Detailed CV reflecting qualification, Valid Supervisor Certificate, relevant experience and references from previous clients* • Assistant Construction Work Supervisor & CR 8(8) Competency, *Detailed CV reflecting qualification, Valid Supervisor Certificate, relevant experience and references from previous clients.* • Construction H&S Officer CR8(5) & Competency Valid registration and CV reflecting appropriate experience and contact details • Risk Assessor & Competency CR 9(1) • Fall Protection Planner & Competency CR 10(1)(a) • Legal Appointments e.g. CR 6(1) and Section 37(2) • First Aider & Competency GSR 3(4) • Incident investigator & Competency GAR 9(2) • Fire fighter and inspector & Competency CR 29(h)(i). • Construction Vehicle/plant operator and inspector & Competency CR 23(1)(d)(k). • Temporary electrical installation inspector & Competency EIR(9)(2)	• Emergency co-ordinator& Competency • Portable Electrical tool inspector • Hand tools inspector • Housekeeping inspector CR 27 • Stacking and storage inspector & Competency CR 28(a) • Temporary electrical installation inspector & Competency EIR(9)(2) • Flammable liquids Storage Inspector • Hazardous substance storage inspector • Scaffolding Erectors & Inspector Competency CR 16(1) • Ladders Inspector GSR 13 (a) • Principal Contractor appointment CR 5(1)(k). • Health and Safety Representative .Section 17(1) where applicable. • Anyone on site with the highest ranking and fulltime on site COVID-19 manager 16(5) • COVID-19 officer, it can be a safety officer (full time on site) or safety representative appointed on site. • Working at heights :SANS 229995 • Fall rescuer :SANS 229998

Annexure B

Client Specific Requirements

Items	Client Specific Requirements
Site Office location	• The location of the site office should be in an area that will not require visitors to pass through or enter area where construction work is active and will not require the re-location of the office as the project progresses.
Medical Certificates	• In compliance with the requirements of the Construction Regulations 2014 section 7(8) the Contractor must ensure that all of his employee's onsite have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3.
Appointment of a full -time safety officer	• The Principal Contractors will have to appoint a competent full - Time Construction H&S Officer for this project.
Appointment of an Approved Inspection Authority (AIA)	• A registered (AIA) Approved Inspection Authority personnel is appointed in ensuring that the asbestos regulations
Extreme weather conditions	• If the weather condition poses a threat to the health & safety of employees be it extreme heat, cold, lighting or any adverse weather condition appropriate safety measures have to be taken.
Change to scope of work	• Should there be changes to the original scope of work, the Principal Agent must inform appointed Construction Health and Safety Agent to effect changes to the OHSE Specification.
Safety Plan Submission	• The successful Tenderer must submit a copy of the detailed OHSE Plan for approval and keep the original for onsite use during construction. The principal Contractor will not be allowed to start site establishment before his/her SHE Plan has been approved in writing.
Bylaws	• The Principal Contractor must incorporate any aspects of the Local Municipal bylaws which affect the, Safety and Environmental wellbeing of the employees and the public into his/her OHSE Plan and ensure compliance to such bylaws.
Risk assessment for construction work	• To comply with CR(9) and to also address environmental issues • To also include exposure to hazardous gases *See the attached baseline risk assessment to be considered by both the designer and the principal contractor.*
Fall protection	• To comply with CR (10), • Edge protection and protection of floor openings need to be of such a manner as to properly protect employees from falling off elevated positions or falling into floor openings
Structures	• To comply with CR (11)

Scaffolding	• To comply with CR(16) and the following; • Scaffolding Inspectors and Scaffolding Erectors must be different individuals. • Scaffold Harness must be used on Scaffolding, normal Harnesses may not be used on scaffolding • Sufficient Scaffolding material e.g., tags, trapdoors etc. need to be on site as determined by the activities on site • Scaffold bases may not be supported by materials such as bricks and chipboard. Suitable material needs to be used as per SANS 10085
Construction vehicles and mobile plant	• To comply with CR (23) and the following;
Electrical installations and machinery on construction sites	• To comply with **CR (24)**
Use and temporary storage of flammable liquids on construction sites	• To comply with **CR (25)**
Housekeeping and general safeguarding on construction sites	• To comply with CR (27) and the following; • Contractor to designate areas for placing refuse and rubble prior to being removed from site • Contractor must implement a daily task site clean-up for all activities these should cover work areas, stairways, walkways etc. to free of any construction debris obstruction. • Refuse to be separated for recycling purposes • Hazardous materials such as asbestos may not be included in general rubble and need to be disposed of as per applicable legislative requirements
Stacking and storage on construction sites	• To comply with CR (28)
Fire precautions on construction sites	• To comply with CR (29) and the following; • No smoking may be permitted on site except in designated smoking areas
Construction employees' facilities	• To comply with CR (30) and the following; • Gender signs to be placed at appropriate locations • All welfare facilities to be kept in a hygienic condition at all times • Employees to be trained in good hygiene practices
Public Safety & Signage	• The Principal Contractor engaged in construction work must ensure that each person working on or visiting a site, and the general public in the vicinity of the construction site, shall be made aware of the dangers likely to arise from onsite activities and the precautions to be observed to avoid or minimise those dangers. • Appropriate signage shall be posted at conspicuous points within and around the perimeter of the site. The steps to comply with this requirement must be outlined in the OHSE Plan. • The public or visitors may only be permitted on site if they go through an appropriate health and safety induction detailing hazards and risks they may be exposed to and what measures are in place to control these hazards and risks • The entire project site must be secured against unauthorized access and provided with appropriate warning signage. Where roadways or walkways must be encroached or

	closed due to work, adequate barriers shall be installed to safely redirect the flow of vehicles and pedestrians and protect them from construction activities. • Whenever it is necessary to maintain public use of work areas (such as sidewalks, ramps, entrances to buildings, corridors, or stairways), the public shall be protected with appropriate guardrails, barricades, temporary fences, overhead protection, or temporary partitions and hoarding. The public must also be adequately protected from any work created hazards, such as excavations. Appropriate warnings, signs, warning lights and instructional safety signs shall be conspicuously posted and placed where necessary. • The public must also be protected from falling debris and objects from the project site. Overhead protection shall be provided that will fully protect the public and be capable of withstanding the maximum forces that could be applied from potential falling objects. Special attention shall also be given to developing adequate means to protect against wind-blown debris and construction-related materials.
Asbestos Work	• The Principal Contractor shall comply with Asbestos regulations 2020 version but not limited to the requirements below: 1. The plan of work to be submitted to the client for review and approval prior work commences 2. The asbestos zone shall be designated. 3. Competency of asbestos workers and agent registered with department of labour. 4. The storage of asbestos waste material shall be in a skip where the material shall be fully covered and kept sealed to prevent any possible asbestos airborne. 5. The requirements of the disposal certificate being obtained the asbestos disposal site in a period of 7 working days after disposal. 6. The asbestos Zone shall be clearly demarcated with no unauthorized person being permitted to enter, entry only permitted, on instruction from AIA being given that normal work may proceed in the area.
On Site Health and Safety Training & Induction	• The Principal Contractor shall ensure that all site personnel and visitors undergo a risk-specific health & safety induction training session before starting work or being permitted to enter the site. A record of attendance shall be kept in the health & safety file. • The Principal Contractor shall ensure that, on site periodic toolbox talks take place at least once per week. These talks should deal with risks relevant to the construction work at hand. A record of attendance shall be kept in the health & safety file. The above should also cover all sub-contractors that are onsite. • All Contractors have to comply with this minimum requirement. Environmental issues to be included in toolbox talks where required.
General Record Keeping	• The Principal Contractor and all Sub Contractors must keep and maintain Health and Safety records to demonstrate compliance with this Specification, The OHS Act 85/1993; and with the Construction Regulations of 2014. The Principal Contractor shall ensure that all records of incidents/accidents, training, inspections; audits, etc. are kept in a health & safety file held in the site office, which must be present on site at all times. • The Principal Contractor must ensure that every Sub Contractor opens its own health & safety file, maintains the file and makes it available on request.
Health & Safety Audits, Monitoring and reporting	• The Client shall conduct monthly health & safety audits. The Principal Contractor is obligated to conduct similar audits on all Sub Contractors appointed by them at least once a month. Detailed audit reports must be presented and discussed at all levels of

	project management meetings and a copy of such audit will be provided to the Client or it's duly appointed Agent within 7 working days of such audit. Copies of the Client's audit reports shall be kept in the Principal Contractors Health & Safety File.
Emergency Procedures	• The Principal Contractor shall submit a detailed Emergency Plan for approval by the Client prior to commencement on site. The plan shall detail the response procedure including the following key elements: 1. List of key competent personnel; 2. Details of emergency services; 3. Actions or steps to be taken in the event of the specific types of emergencies; 4. Information on hazardous material/situations.
First Aid Boxes and First Aid Equipment	• The appointed First Aider(s) to be in possession of a valid first aid training certificate Level 2. Valid certificates are to be kept in the Site Safety File. All Sub Contractors with more than 5 employees shall supply their own first aid box, except if otherwise agreed upon between Principal and Sub- Contractor in writing.
Accident / Incident Reporting and Investigation	• Injuries are to be categorised into Near miss, first aid, LTI, fatal etc. Fatal accidents to be reported in addition to applicable legislative requirements to the Client or its duly appointed Agent with immediate effect. The Principal Contractor must stipulate in its construction phase OHSE Plan how it will handle each of these categories. When reporting injuries to the Client, these categories shall be used. The Principal Contractor shall investigate all injuries, with a report being forwarded to the Client immediately. All Sub- Contractors have to report on the abovementioned categories of injuries to the Principal Contractor at least monthly. All categories of incidents/accidents must be in the Statistics Section of the Monthly Audit Reports, submitted to the Client.
Hazards and Potential Situations	• The Principal Contractor shall immediately notify other Sub Contractors as well as the Client of any hazardous or potentially hazardous situations that may arise during performance of construction activities. • Should a hazardous situation require work stoppages, the work must be stopped and corrective steps taken such as the issue of Written Safe Work Procedures and the issue of Personal Protective Equipment.
Personal Protective Equipment (PPE) and Clothing	• The Principal Contractor must ensure that all workers are issued with the required PPE as required by the risks associated with the activities they perform .The minimum PPE to be worn on site will be Safety Shoes/Boots, Hard Hats, Overalls and reflective vests. No Visitors may enter the site without Safety Shoes/Boots and Hard hats. The Principal Contractor and all Sub Contractors shall make provision and keep adequate quantities of SABS approved PPE on site at all times. All employees issued with PPE to be trained in correct use, records of training and issue to be kept in the Site SHE File .Procedure to be in place to deal with: • 1 Lost or stolen PPE; • 2 Worn out or damaged PPE replacement. • 3. Employees not utilising PPE as required • The above procedure applies to Principal Contractors and their appointed Sub-Contractors, as they are all employers in their own right.
Permits	1) The Principal Contractor shall prepare and issue the required written permits relating to but not limited to the following: • Hot Work • Roof Work; and • Electrical work (both temporary and permanent) 2) The Principal Contractor must ensure that where permits are required that they

	are properly implemented and adhered to.
Speed Restrictions and Protections	Unless otherwise stipulated, the maximum speed limit on sites must be limited to 10 km/h. 1) Vehicle movement routes on site must be clearly indicated where applicable. 2) Signage to ensure the safe movement of vehicles on site, as well as to ensure the health and safety of all employees and visitors on site, must be displayed in strategic locations.
Hazardous Chemical Substances (HCS)	1) To comply with Hazardous Chemical Substances Regulations as published in Government Notice No. R. 1179 dated 25 August 1995. 2) In addition to the abovementioned, **Material Safety Data Sheets (MSDS)** must be kept on site for all materials, which may contain hazardous chemical substances.
Fire Extinguishers and Fire Fighting Equipment	1) The Principal Contractor and Sub-Contractors must allow for and provide adequate provision of regularly serviced temporary firefighting equipment located at strategic points on site, specific for the classes of fire likely to occur. 2)The appropriate notices and signs must be allowed for and be erected as required 3) Contractors may not utilize fire protection equipment belonging to the Client without prior consent
Ladders and Ladder Work	1) The Principal Contractor must allow for and ensure that all ladders are clearly numbered, inspected at least monthly, are in a good safe working order, are the correct height for the task, extend at least 1m above the landing, are fastened and secured and are placed at a safe angle. 2) Records of inspections must be kept in a register on site.
General Machinery	To comply with Driven Machinery Regulations as published in Government Notice No. R. 1010 dated 18 July 2003
Portable Electrical Tools and Hand Tools	1) The Principal Contractor shall ensure that all electrical tools areclearly numbered, electrical distribution boards, extension leads, and plugs are kept in a safe working order. 2.) The Principal Contractor shall ensure that all portable electrical Equipment, is clearly numbered, inspected by a competent appointed person and records of such inspections to be kept on record in an appropriate register on the site SHE file 3) The Principal Contractor shall allow for and ensure the following in relation to hand Tools: That a "Competent Person" undertakes routine inspections and records are kept on site. • That only authorized trained persons use the tools. • That safe working procedures apply. • That PPE is provided and used.
High Voltage Electrical Equipment Installations and Equipment	1) All Employees must be made aware of the presence and location of High Voltage Equipment such as underground cables and overhead lines, and ensure that the necessary precautionary steps are taken where work has to be executed in the vicinity of such equipment. 2) Precautionary measures such as Isolation and Lock-Out of electrical systems or the use of electrically isolated tools must be used.
Adequate Lighting	All Contractors must allow for and ensure that adequate lighting is provided to allow for work to be carried out safely.
Transportation of Workers	1) In addition to CR 23 the following will apply **The Principal Contractor and Sub-Contractors shall not:** • Transport persons together with goods or tools unless there is an appropriate area or section of the vehicle in which to store such goods. • Transport persons on the back of trucks except if a proper canopy (properly covering

	the sides and top) has been provided with suitable seating areas. • Permit workers to stand or sit on the edge of the transporting vehicle. • Transport workers in LDVs unless they are closed/covered and have the correct number of seats for the passengers • No driver may transport more than six people on the back of a 1 Ton LDV and more than four passengers on the back of a ½ Ton LDV. 2) The driver of any LDV may not permit more than two passengers to occupy the cab of any LDV. 3) Drivers of such vehicles must have a valid driver's license for the code of vehicle being driven by them. 4) No servicing of vehicles will be permitted on a Construction Site. No Vehicles or machinery leaking oil will be permitted on site due to the risk posed to the environment. 5) Any oil or diesel spilled on site must be cleaned up as per accepted environmental practice.
Occupational Health and Hygiene	1) Occupational exposure is a major problem and all Contractors must ensure that proper health and hygiene measures are put in place to prevent exposure to these hazards. 2) All Contractors must prevent inhalation, ingestion and absorption of any harmful chemical or biological agents 3) Water to be utilized for drinking purposes may only be drawn from taps designated for drinking water purposes. Fire hydrants and fire hose reels may not be utilized for drinking water purposes.
Environmental Management	• The Principal Contractor and Sub-Contractors must comply with the requirements of NEMA Act. • The Principal Contractor must develop a waste management plan, implement and maintained it onsite • Cement mixing to be done at a predetermined location on site which must include a solid, slab, and bunded edges to prevent runoff • Contaminated run off water from the site must be treated such as to ensure that it does not pose a risk to the environment • Any material which may have a harmful effect when disposed of by normal means must be disposed of in an appropriate manner to eliminate its harmful effect on the environment after disposal. • The Principal Contractor must allow for and ensure that adequate procedures are implemented and maintained to ensure that waste generated is placed in suitable receptacles and removed from the site promptly. • Plans to deal with spillages must be in place and maintained. • No waste materials (liquid or solid) may be disposed of in drains. • No burning of waste material may take place on site as such material being burned may result in pollution of the air or give off toxic vapours which could be harmful to the health of employees or any other person present on site.
Alcohol and other Drugs	• No alcohol and other drugs will be allowed on site without the express permission of the Principal Contractor • No person may be under the influence of alcohol or any other drugs while on the construction site. • Any person on the construction site who is on prescription drugs must inform his/her Employer accordingly and the Employer shall in turn report this to the Principal Contractor immediately.

	• Any person on the construction site who is suffering from any illness/condition that may have a negative effect on his/her safety performance must report this to his/her Employer, who in turn must report this to the Principal Contractor forthwith. • Any person on the construction site who is suspected of being under the influence of alcohol or other drugs must be removed from site immediately and be instructed to report back the next day for a preliminary inquiry. A full disciplinary procedure must be followed by the Contractor concerned and a copy of the disciplinary action must be forwarded to the Principal Contractor for his records.

Annexure C

CONTRACTOR'S SAFETY, HEALTH AND ENVIRONMENTAL DECLARATION FOR TENDERS

INTRODUCTION

In terms of *Construction Regulation 5(1)(h)* of the *Construction Regulations of February 2014* a Contractor may only be appointed to perform construction work if the Client is satisfied that the Contractor has the necessary competencies and resources to carry out the work safely in accordance with the *Occupational Health and Safety Act, Act 85 of 1993* and the Construction Regulations of February 2014. In line with this requirement the Contractor is required to read through this document carefully, sign it and submit it with his/her Tender.

DECLARATION

1. I the undersigned hereby declare and confirm that I am fully conversant with the Occupational Health and Safety Act, Act 85 of 1993, the Construction Regulations of February 2014 and the Construction Safety, Health and Environmental Specification attached in the tender document.

2. I hereby declare that my company and its employees has the necessary competency and resources to safely carry out the construction work under this contract in compliance with the Occupational Health and Safety Act, Act 85 of 1993,the Construction Regulations of February 2014 and the Construction Safety, Health and Environmental Specification.

3. I hereby confirm that adequate provisions has been made in my tender to cover the cost of all Safety, Health and Environmental duties and responsibilities imposed on me by the Occupational Health and Safety Act, Act 85 of 1993, the Construction Regulations of February 2014 and the Construction Safety, Health and Environmental Specification.

4. I confirm that I may not commence with any part of construction work under the contract until my Construction Safety, Health and Environmental Plan has been approved in writing by the Client.

5. I hereby confirm that copies of the following documentation will be kept on site for viewing and inspection purposes for the duration of the construction work:

   a) Client's Construction Safety, Health and Environmental Specification
   b) Approved Construction Safety, Health and Environmental Plan
   c) Occupational Health and Safety Act, Act 85 of 1993, and
   d) Construction Regulations of February 2014.

6. I agree that my failure to complete and execute this declaration to the satisfaction of the Client will mean that I am unable to comply with the requirements of the Occupational Health and Safety Act, Act 85 of 1993 and Construction Regulations 2014, and accept that my tender will be rejected.

Signature:..... Date:.....

Annexure D
Baseline Risk Assessment
Please note that this is a Baseline Risk Assessment and not a detailed Risk Assessment.
Activities as listed below may not be in the sequence preferred by the Contractor or may be conducted at the same time
(COVID-19 Baseline Risk Assessment)

Project:	DEPARTMENT OF HEALTH: ST Andrews hospital

REF N0	075988	RISK ASSESSOR	K.R MNCWABE	REVISION	00	DATE	28/02/2022

Likelihood		Consequence		RISK VALUE= LIKELYHOOD X CONSEQUENCE	RISK RANKING Score	RANKING
Rare	1	Negligible	1		0-5	1
Unlikely	2	Minor	2		6-10	2
Possible	3	Moderate	3		11-16	3
Likely	4	Major	4		17-20	4
Almost certain	5	Severe	5		21-25	5

MAIN ACTIVITY	Site establishment

REF NO	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number

MAIN ACTIVITY	SITE ESTABLISHMENT								
REF NO 1	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number
1.1	Fencing/ Hoarding the site	1.Manual Handling 2.Struck by 3.Sharp edges 4.Physical exertion 5.Tripping Hazards 6. Hidden services , etc.	1. Muscular strain 2.Brusing, fractures 3.Cuts, abrasion 4.Dehydration 5.Fractures, 6. Electrocution, death etc.	None	1.Tripping, cuts etc.	3x3=9	HIRA, Competent Management, Competent Supervision, safe systems of work, competent operators, Cable Detection Equipment usage, competent personnel for operating cable detection machine, Medical Fitness Certificates, signage and barricading, training. PPE etc.	1x2=2	1
1.3	Loading/Off-loading materials and equipment (Mechanical)	1.Uncontrolled movement of loads 2. Limbs caught between surfaces 3.Heated surfaces, 4. HCS 5. Sharp edges. 6.Moving Vehicles.	1.Fractures,death, damage 2. Abrasions. Fractures, Cuts. 3.Burns 4. Dermatitis 5. Cuts 6.Vehicle/property Equipment damage, Fractures, Death etc.	1.Contamination of resources -- oil leaks, fuel spillage	1.Death, Fractures , Damage etc.	4x4=16	HIRA, Competent Management, Competent Supervision, safe systems of work, competent operators, Flagmen, Medical Fitness Certificates ,Vehicle maintenance records, signage and barricading, training. PPE etc.	3x3=9	2

1.4	Loading/Off Loading materials and equipment (Manual)	1. Uncontrolled Movement. 2.Sharp edges 3.Caught Between Surfaces 4.Falling Materials 5.Incorrect Lifting methods 6. Spillage etc.	1.Muscular strain 2.Cuts, abrasions 3.Brusing, fractures 4.Crushing ,cuts 5.Lower back injuries 6.Dermatitis etc.	1.Contamination of resources due to spillage of HCS, oil leaks,etc if present.	none	4x5=20	HIRA,,Competent Management, Competent Supervision, safe systems of work, competent operators, Medical Fitness Certificates ,Vehicle maintenance records, signage and barricading, training in collect lifting methods, PPE etc.	3x3=9	2
1.5	Positioning of equipment and site office on site (mechanical)	1.Uncontrolled movement of loads 2. Limbs caught between surfaces 3.Heated surfaces, 4. HCS 5. Sharp edges. 6. Moving vehicles.	1. Fractures, death, damage. 2. Abrasions. Fractures, Cuts. 3.Burns 4. Dermatitis 5. Cuts 6.Vehicle/property Equipment damage, Fractures, Death etc.	1.Contamination of resources – oil leaks, fuel spillage	1.Death, Fractures , Damage etc.	4x5=20	HIRA, Competent Management, Competent Supervision, safe systems of work, competent operators Flagmen, Medical Fitness Certificates ,Vehicle maintenance records, signage and barricading, training. PPE etc.	3x3=9	2
1.6	Electrical Connection to the Site Office	1.Electricity 2.Sharp edges, 3.Physical Exertion 4. Poor working posture etc.	1. Electrocution, death 2. Cuts and bruises. 3.Muscular strain, etc.	None	None	4x5=20	HIRA ,Competent Supervision and Management, Insulated tools ,Lock out, testing and tagging , permit issue, PPE etc.	2x3=6	2

1.7	Water connection to site office area	1.Sharp edges ,2.Hot climatic conditions, 3.Physical exertion, 4.Poor working posture etc.	1.Cuts, 2. Heat stroke, 3.Muscular strain, 4. Back strain etc.	None	None	2x2=4	HIRA, Competent Management, Competent Supervision, safe systems of work, Medical Fitness Certificates, training. PPE etc.	1x1=1	1

MAIN ACTIVITY	REMOVAL OF ASBESTOS ROOF SHEETS								
REF NO 2.	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number

2.1.	Removal of Roof sheeting Nails or Anchors	1.Repetitive motion 2. Flying asbestos airborne. 3. Defective tools etc. 4. Fragile surfaces, Unprotected edges etc.	1.Muscular strain, 2.Eyes irritation 3.electtrocution etc. 4. Falling and breaking limbs.	None	None	4x2=8	Hira, Training, PPE e.g. respiratory protection ,approved work plan, AIA to HIRA, Approved Plan Of Work, AIA to Monitor compliance with Plan of Work and Legislative requirements, Competent Supervision, Correct PPE, Decontamination Facilities for workers, Communication records of Risk Assessments , Method Statements etc.	2x2=4	1
2.2.	Handling of asbestos	1. Asbestos Dust inhalation. 2. Flying particles. 3. Use of non-risk appropriate PPE	1. Lung diseases. 2. Eyes irritation, etc. 3.Skin irritation	Public breathing air with airborne	None	2x2=2	Hira, Training, PPE e.g. respiratory protection , etc.	2x1=1	1

2.3	Lowering of asbestos sheets	1. Falling hazards. 2. Struck by 3. Sharp edges. 4.Windy conditions etc.	1. Head and body injuries. 2. Cut and bruises. 3. Falling objects and injuries.	None	Falling objects to the motorists and pedestrians.	4x4=16	Hira, Training, PPE e.g. respiratory protection , etc.	2x2=4	1

MAIN ACTIVITY	SCAFFOLD , SCREEN, BARRICADING SIGNAGE ETC. ERECTION								
REF NO 3	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number
3.1	Collection and placement of materials	1. Struck by sharp edges, 2. Physical exertion, 3. Manual handling etc.	1. Abrasions 2.Cuts 3.Muscular strain 4.Fractures etc.	none	1. Struck by falling objects 2. Slipping, tripping etc.	4x5=20	HIRA, Competent Supervision, Fall protection plan communication, competent in working at height, competent scaffolding work adequate fall preselection equipment etc.	2x3=6	2
3.2.	Erection of scaffolding structure/s and hoarding	1. Falls from height, dropping of items 2. Sharp edges, 3.Scaffolding collapse, struck by falling items etc.	1. Back strain, 2. bruising, 3. cuts, 4.abrasions, 5.Fractures, death	none	1.Struck by falling items	3x3=9	Safe system of work, use of fall arrest equip, erection of safe scaffolding, Supervision, etc.	1x1=1	1

3.3.	Erection of barricading	1.Hidden services 2.Physical exertion, 3.Struck by sharp edges etc.	1.Abrasions 2.Cuts 3.Muscular strain, 4.Fractures, 5.Electrocution etc.	None	1. Struck by falling objects, slipping, tripping etc.	4x4=16	HIRA, Supervision, PPE, Safe Systems of work etc.	3x3=9	2
3.4.	Fitment of signage	1.Physical exertion, 2.Sharp edges etc.	1.Muscular strain , 2.Cuts etc.	None	1.Struck by falling objects, slipping, tripping etc.	2 x2=4	HIRA, Supervision, PPE, Safe Systems of work etc.	1 x1=1	1
MAIN ACTIVITY	ROOF WORK								
REF NO 6	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number

61.	Damaged roof sheeting to be repaired.	1.Falls 2.Struck by falling objects 3.sharp edges 4. Climatic conditions 5.Manual Handling	1.Muscular strain, 2.Muscular strain 3.Cuts 4.Heat exhaustion 5. Facture and Death etc,	None	None	4x5=20	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	3x3=9	2
	TOTAL VALUE OF ACTIVITY					55	25		
MAIN ACTIVITY	REPAIRING WALLS								
REF NO 8	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number
8.1.	Cleaning and washing walls	1.High pressure steam 2.Flying materials 3. Electricity etc.	1.Biological hazardous 2.Electrocution 3.Skin penetration etc	None	None	4x3=12	Risk assessment Training of employees; Supervisor, Safe work procedure. PPE etc.	2x2=4	1

8.2.	New plastering and waterproofing in patches where necessary	1.Abrasive surfaces 2.Poor working posture, 3.Hot climatic conditions, 4.Falls 5.Cement Dust, 6.HCS etc.	1.Abrasions, 2.Muscular strain, 3.Heat exhaustion, 4.Dermatitis, 5.Lung infection, 6.Fracture and Death etc.	Discarding of unused cement-contamination of natural resources	None	3x4=12	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	3x2=6	2
8.3.	Painting all walls in unsatisfactory condition	1.Repetitive Motion 2.HCS 3. High environmental temperatures	1.Muscular Strain 2. Dermatitis 3. Heat exhaustion	Contamination of natural resources due to wrong disposal of waste	None	3x2=6	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	1x1=1	1
	TOTAL VALUE OF ACTIVITY					30		11	
MAIN ACTIVITY	INSTALLATION OF CEILINGS								

REF NO 10	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number
10.1.	All damaged ceiling to be replaced where applicable.	1.Falls 2.hazardous dust 3.sharp edges 4. Poor Work posture	1.Muscular strain, 2.Fracture 3.Cuts 4.Dust inhalation	None	None	3x3=9	Training, PPE, safe systems of work and supervision	1x1=1	1
10.2.	All acoustic suspended ceilings on all floors to be removed.	1.Falls 2.hazardous dust 3.sharp edges 4. Poor Work posture	1.Muscular strain, 2.Fracture 3.Cuts 4.Dust inhalation	None	None	3x3=9	HIRA, Competent Management, Competent Supervision, safe systems of work, Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, barricading, training, PPE etc.	1x1=1	1

10.3.	All damaged exposed slab soffits to be repaired and painted.	1. Physical injuries from falling from roof height and from materials falling from heights; 2. Injuries from falling off during wet weather work & windy conditions. 3.Repetitive Motion 4.HCS	1. Back strain from lifting heavy material. 2.Muscular Strain 3. Dermatitis 4. Heat exhaustion	None	None	**4x5=20**	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	**3x3=9**	**2**
11.3.	Repaint all existing steel doors frames.	1.Repetitive Motion 2.HCS 3. High environmental temperatures	1.Muscular Strain 2. Dermatitis 3. Heat exhaustion	Contamination of natural resources due to wrong disposal of waste	None	**3x2=6**	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	**2x2=4**	**1**

11.4	All existing ironmongery to be service. Replace all missing ironmongery.	1.Struck by Items 2.Hands Caught in between areas 3.falling objects 4.sharp edges 4. Noise, Dust, etc	1.Muscular Strain 2. Dermatitis 3. Heat exhaustion 4. Lung infection	None	None	3x3=9	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	1x1=1	1
MAIN ACTIVITY	**ELECTRICAL WORK**								
REF NO **19.**	**SUB ACTIVITY**	**HAZARDS SHE**	**HEALTH RISK**	**ENVIRO MENTAL RISK**	**PUBLIC RISK**	**PURE RISK**	**RECOMMENDED RISK CONTROL MEASURE**	**RESIDUAL RISK**	**Risk Prioritisation Number**
19.1.	Test all plug sockets.	1.Cuts & abrasion; 2.Trips & falls; 3. Electric shock; 4.Electrocution; etc.	1.Back strain; 2.Dust inhalation; 3.Electrocution; etc.	None	None	4x5=20	Medical Fitness Certificates, Competent Management, Competent Supervision, safe systems of work. Training, PPE,	3x3=9	2

19.2.	Install double 3 pin plug sockets to rooms.	1.Cuts / laceration 2.Poor working posture 3.Electricity, 4.Confined space, 5. Falls from height, etc.	1.Abrasions 2.Electrocution	None	None	**3x2=6**	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	**2x1=2**	**1**
19.3.	All damaged/missing plug sockets to be replaced.	1.Cuts / laceration 2.Poor working posture 3.Electricity, 4.Confined space, 5. Falls from height, etc.	1.Abrasions 2.Electrocution	None	None	**3x2=6**	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	**2x1=2**	**1**

19.4.	All damaged/missing light switches to be replaced.	1.Electricity, 2.Cuts / laceration 3.Confined space, 4. Falls from height, etc.	1.Abrasions, 2. Electrocution 3.Heat exhaustion	None	None	**3x4=12**	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	**3x3=9**	**2**
19.5.	Install bulbs in light fittings.	1. Elevated work 2. Physical exertion, 3.Incompetent operator 4.Unsafe Portable electrical tools, 6. Dust	1. Falls from height =fractures etc. 2,Fractures, sprains as result of lack of control of machine by the operator 3. Muscular strain 4. Electrocution due to contact with exposed wiring etc. 5.Dust inhalation	None	None	**4x5=20**	HIRA, Method Statement, Safe Work procedure, Medical fitness certificates, Training of operators, Inspection of equipment, PPE etc.	**3x3=9**	**2**
19.6.	Install Electrical Meters.	1. Falls from height 2. Trips & falls 3.Electric shock; 4.Electrocution; etc.	1.Back strain; 2 Abrasions 3.Electrocution; etc.	None	None	**3x2=6**	HIRA, Method Statement, Safe Work procedure, Medical fitness certificates, Training of operators, Inspection of equipment, PPE etc.	**2x1=2**	**1**

19.7.	Install 60A isolators and 3 pin plug sockets to kitchen and laundry areas.	1. Noise 2. Dust 3. Electricity 4. Bumping against 5. Struck by flying items 6. Entanglement 7. Moving parts	1. noise induced hearing loss 2. dust inhalation 3. Electrocution 4. cuts and abrasions	None	none	**4x5=20**	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	**3x3=9**	**2**
19.8.	Provide electrical points to kitchens.	1.Cuts & abrasion 2. trips & falls 3.Electric shock 4. Electrocution; etc.	1.Back strain 2.dust inhalation 3.Electrocution; etc.	None	None	**3x2=6**	Medical Fitness Certificates, Competent Management, Competent Supervision, safe systems of work. Training, PPE.	**2x1=2**	**1**

19.9.	Replace all missing/damaged DB Board covers.	1. Noise 2. Dust 3. Electricity 4. Bumping against 5. Struck by flying items 6. Entanglement 7. Moving parts	1. Noise induced hearing loss 2. Dust inhalation 3. Electrocution 4. Cuts and Abrasions.	None	none	4x5=20	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	3x3=9	2
	TOTAL VALUE OF ACTIVITY					116		53	
MAIN ACTIVITY	INSTALLATION OF A FIRE DETECTION SYSTEMS.								
REF NO 20.	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number

20.1.	Use of portable electrical tools	1.Physical injuries from being struck by unsafe portable electrical tools 2.Burnt by flying sparks 3.falls from tripping, etc.	1. Electrocution from electrical tools with exposed live wires. 2. Facial and eyes injuries; etc. 3. Breaking body limbs.	Land pollution (from poor housekeeping)	Exposed to intermittent noise levels & dust inhalation	**4 x5=20**	Safe systems of work, training, PPE, Good Housekeeping Practises, Supervision; etc.	**2x3=6**	**2**
20.2.	Install new fire lines	1.Cuts & abrasion; 2.Electrical shock; 3.Struck by unsafe portable electrical Tools. 4.Falls & trips 5. Manual handling. 6. Elevated work 7.Sharp edges, 8.Physical exertion, 9.Dust, etc.	1.Electrocution; 2.Back pains 3.Heat exhaustion; 4.Dust inhalation etc.	None	Cuts & abrasion; electrical shock; struck by unsafe portable electrical tools; falls & trips; etc.	**4x5=20**	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	**3x3=9**	**2**

20.3.	Install new hose reel and hydrants	1.Cuts & abrasion; 2.Electrical shock; 3.Struck by unsafe portable electrical tools. 4.Falls & trips 5. Manual handling. 6. Elevated work 7.Sharp edges, 8.Physical exertion 9.Dust, etc.	1.Electrocution; 2.Back pains 3.Heat exhaustion; 4.Dust inhalation etc.	None	Cuts & abrasion; electrical shock; struck by unsafe portable electrical toots; falls & trips; etc.	**4x5=20**	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	**3x3=9**	**2**
20.4.	Install new fire pipes	1.Elevated work 2. Manual handling 3.Sharp edges 4.Pressure 5. Falls & trips	1.Falls 2.Fractures 3. Cuts etc.	none	none	**3x4=12**	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, screening, training. PPE etc.	**3x3=9**	**2**

20.5.	Install and commission of fire pumps	1.Elevated work, 2.Hazardous, sharp 3.Edges, 4. Struck by tools, 5.Sharp objects, 6.Caught between. 7.Dust, 8. Noise etc.	1.Falls 2.Fractures, 3.Muscular cuts, 4.Abrasion, 5.Heat exhaustion, 6.Noise induced hearing loss 7.Eye injuries 8.Dust inhalation etc.	None	none	3x4=12	HIRA, Training, PPE, safe systems of work and supervision etc.	3x3=9	2
20.6.	Install and commission of new pumps up to elevated tank	1. Falls from height 2.Falling objects 3. Sharp edges, 4.Scaffolding collapse, 5.Struck by falling items 6. Caught between. 7. Struck by tools, 8. Dust, 9. Noise etc.	1.Falls 2.Fractures, 3.Muscular cuts, 4.Abrasion, 5.Heat exhaustion, 6.Noise induced hearing loss 7.Eye injuries 8.Dust inhalation etc.	None	none	3x4=12	HIRA, Training, PPE, safe systems of work and supervision etc	3x3=9	2
	TOTAL VALUE OF ACTIVITY					96	51		
MAIN ACTIVITY	USE OF HAND TOOLS,POWER TOOLS AND LADDERS								
REF NO 21	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number

21.1.	Use of power tools	1.Manual handling, 2.Struck by falling items 3.Sharp edges 4.Poor working posture, 5. Tripping 6. Flying debries. etc.	1.Muscular strain, 2.Bruising 3.Fractures, 4.Cuts 5.Abrasion, 6.Lower back strain, 7. Fractures, grazing etc.	None	None	**3x2=6**	HIRA ,Competent Supervision and Management, Insulated tools ,Lock out, testing and tagging , permit issue, PPE etc.	**2x1=2**	**1**
21.2.	Use of hand tools	1.Manual handling, 2.Falling of defective ladders 3.Sharp edges 4.Poor working posture, 5. Tripping. etc.	1.Muscular strain, 2.Bruising 3.Fractures, 4.Cuts 5.Abrasion, 6.Lower back strain, 7. Fractures, grazing etc.	None	None	**3x2=6**	HIRA ,Competent Supervision and Management, tools ,Lock out, testing and tagging , permit issue, PPE etc.	**2x1=2**	**1**
21.3.	Use of ladders	1.Cuts 2.Abrasion; 3.Trips 4. Poor working posture	1. Abrasions 2.Muscular strain	None	None	**3x2=6**	HIRA, Competent Management, Competent Supervision, safe systems of work. Tools and equipment inspections, Medical Fitness Certificates, continuous housekeeping signage, training. PPE etc.	**2x1=2**	**1**
MAIN ACTIVITY	**GENERAL SITE ACTIVITIES**								

REF NO 22.	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number
22.1.	Sweeping	1.Repetitive motion 2.Dust, 3. Excessive environmental temperatures etc.	1.Muscular strain, 2.Dust inhalation 3.Heat exhaustion etc.	None	None	2x2=4	Hira, Training, PPE e.g. respiratory protection , etc.	2x2=4	5
22.2.	Lifting and Lowering	1.Heavy loads difficult to grasp items 2.Incorrect lifting methods, caught between etc.	1.Muscular strain, 2.lower back injuries , etc.	None except if item is dropped and poses an environmental risk due to its chemical properties	None	1x2=2	HIRA ,Training , etc.	1x1=1	1
22.3.	Painting	1.Poor working posture 2.Repetitive motion 3.Hazardous chemical substances etc.	1.Dermatitis 2.Muscular strain etc.	Contamination of natural resource, spillage and disposal	None	1x2=2	HIRA, Training, Supervision, PPE etc.	1x2=2	1
22.4.	Ladder work	1. Elevated position, 2.Incorrect positioning, 3.Poor location slippery surfaces etc.	1.Fractures 2.Death etc.	None	Minor bruising etc.	1x4=4	HIRA, Training, Supervision, PPE etc.	2x2=4	1
22.5.	Use of Portable Electrical equipment	1.Electricity, 2.Faulty equipment, 3.High speed rotating equipment, 4.Tripping 5. Vibration, 6. Noise etc.	1.Electro-caution 2.Cuts, 3.Abrasions 4.Noise induced hearing loss etc.	None	Noise exposure, fractures, bruising	1x4=4	HIRA, Training, Supervision, PPE etc.	2x1=2	1

22.6.	Driving vehicles on site	1.Collisions 2.Flammable substances etc.	1.Fractures 2.Death, etc.	Contamination of resource due to fuel and oil leakage etc.	Fractures, death, etc.	3x4=12	HIRA, Training, Supervision, PPE etc.	2x2=4	1
22.7.	Extension cords	1.Electricity 2.Tripping hazards	1.Electrocution , 2.Fractures etc.	none	None	1x2=2	HIRA, Training, Supervision, PPE etc.	1x1=1	1
22.8.	Hand tools	1.Tripping 2.Struck by items 3.Bumping against, 4.Abrasions 5.Sharp edges 6.Caught between surfaces 7. Flying metal particles etc.	1.Cuts 2.Bruising 3.Foreign material in eyes etc.	none	None	1x4=4	HIRA, Training, Supervision, PPE etc.	2x1=2	1
22.9.	Scaffolding erection, dismantling	1.Falls from height, 2.Dropping of items, 3.Sharp edges, 4.Scaffolding collapse, etc	1.Back strain, 2.Bruising 3.Cuts 4.Abrasions 5. Broken bones, 6.death etc.	none	None	3x4=12	HIRA, Training, Supervision, PPE etc.	2x2=4	1

MAIN ACTIVITY	INSTALLATION OF CHROMADEK ROOF COVERIGING								
REF NO 24.	SUB ACTIVITY	HAZARDS SHE	HEALTH RISK	ENVIRO MENTAL RISK	PUBLIC RISK	PURE RISK	RECOMMENDED RISK CONTROL MEASURE	RESIDUAL RISK	Risk Prioritisation Number
24.1.	Installation of timber roof Trusses	1.Repetitive motion 2.flying particles, 3. Defective tools etc.	1.Muscular strain, 2.Eyes irritation 3.electrocution etc.	None	None	4x2=8	Hira, Training, PPE e.g. respiratory protection , etc.	2x2=4	1
24.2.	Fitting of battens	1.Heavy loads difficult to grasp items 2.Incorrect lifting methods, caught between etc.	1.Muscular strain, 2.lower back injuries , etc.	None except if item is dropped and poses an environmental risk due to its chemical properties	None	2x2=2	HIRA ,Training , etc.	2x1=1	1
24.3	Fitting of roof sheets	1. Falling hazards. 2. Struck by 3. Sharp edges. 4.Heavy wind blow etc	4. Head and body injuries. 5. Cut and bruises. 6. Falling objects and injuries.	None	Falling objects to the motorists and pedestrians.	4x4=16	HIRA, Training, Supervision, PPE etc.	2x3=6	1

COVID-19 BASELINE RISK ASSESSMENT The COVID-19 hazard identification and risk assessment aims to determine the level of risk exposure on site and for contractors to implement the control measures.			
ACTIVITY / IDENTIFIED POTENTIAL AREA OF EXPOSURE COVID-19	**HAZARDS SHE**	**HEALTH RISK**	**RECOMMENDED RISK CONTROL MEASURE**
Exposure of employees entering the workplace with CV19	1.Transmitting the virus on to other employees, causing illness and possible death 2.Exposure at site access point (security control)	1.Respiratory infection that can lead to fatality's 2. Fever, cough, fatigue	1. Symptomatic individuals will not be allowed entry. 2.Hygiene requirements (handwashing etc.) and symptoms of 3. CV19 included with Induction. 4.CV19 information posters placed in accessible locations in the workplace 5.All employees and visitors, to receive induction training 6.Adequately train identified personnel to perform regular COVID-19 screenings 7. Provide compulsory medical screening equipment and keep documented record of screenings and should an employee be tested positive, then such an
Display symptoms within the workplace	1.Transmitting the virus on to other employees, causing illness and possible death 2. Enhancing the possibility of spreading the Covid 19 pandemic	1.fever, dry cough 2.Tiredness, aches and pains sore throat, diarrhoea conjunctivitis, headache loss of taste or smell, a rash on skin, or discolouration of fingers or toes	1. Worker removed to a designated area at least 2 metres away from other people. 2. The individual will be sent home and advised to follow Governmental guidance. 3. Workplace decontaminated following accepted standards. 4.Relevant PPE to be issued All employees to receive awareness training on COVID-19 and personal hygiene (Toolbox talks) 5.Adequately train identified personnel to perform regular COVID-19 screenings

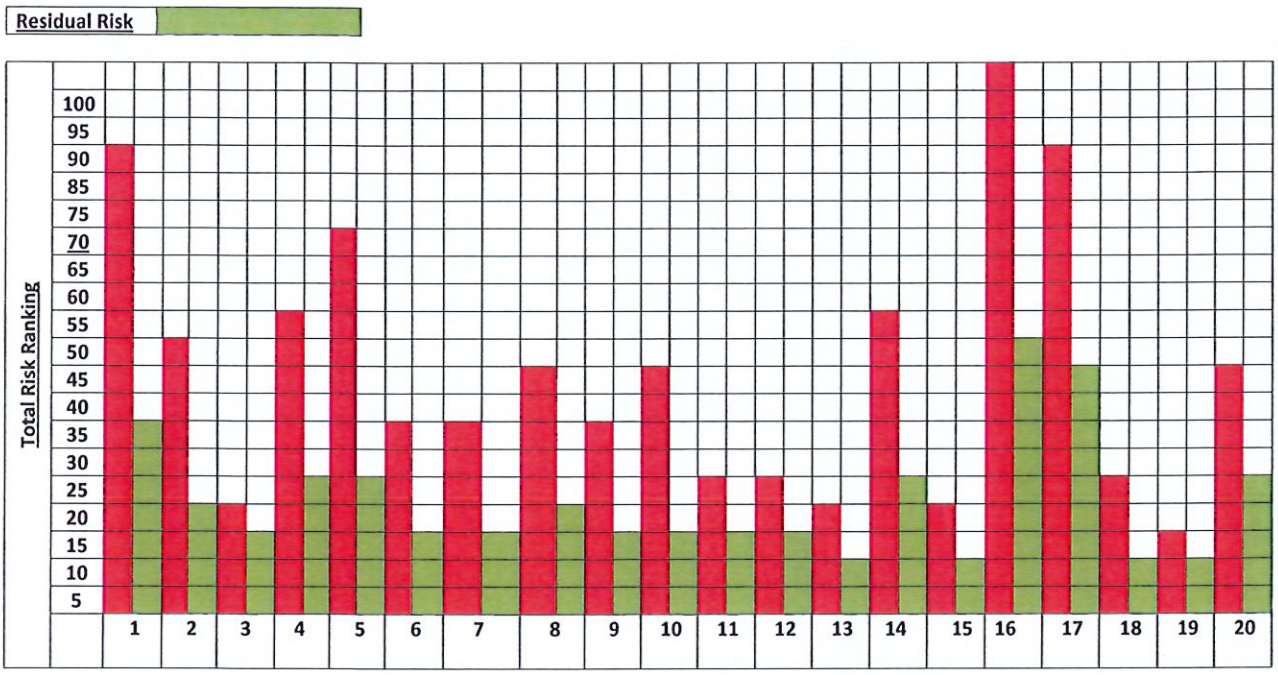
			6.compulsory medical screening equipment and keep documented record of screenings
Contaminated workplace	Workers contracting CV19 due to contaminated surfaces, causing illness and possible death	1.fever, dry cough 2.Tiredness, aches and pains sore throat, diarrhoea conjunctivitis, headache loss of taste or smell, a rash on skin, or discolouration of fingers or toes	1. Cleaning equipment and facilities frequently. 2. Hand sanitisers to be been placed in readily accessible locations. Extra hygiene requirements enforced. 3. PPE to be issued Clean and disinfect objects that are regularly touched.
Overcrowded work areas	Workers contracting CV19 due to working closely with infected colleagues, causing illness and possible death	1.fever, dry cough 2.Tiredness, aches and pains sore throat, diarrhoea conjunctivitis, headache loss of taste or smell, a rash on skin, or discolouration of fingers or toes	1. Social Distancing policy implemented. All work areas and activities been revaluated for the possibility of implementing social distancing (no handshaking, deferring large meetings etc.) 2.Relevant PPE to be issued Clean and disinfect objects that are regularly touched 3.CV19 Information posters placed in accessible locations in the workplace 4.Employees and visitors, to receive induction training 5.Employees to receive awareness training on COVID-19 and personal hygiene (Toolbox talks) 6.Adequately train identified personnel to perform regular COVID-19 screenings
Use of hand tools or equipment onsite	Workers contracting CV19 due to working closely with infected colleagues, causing illness and possible death	1.fever, dry cough 2.Tiredness, aches and pains sore throat, diarrhoea conjunctivitis, headache loss of taste or smell, a rash on skin, or discolouration of fingers or toes	1. Daily disinfecting of all work surfaces, construction work vehicles, portable working tools and equipment prior to resuming construction work. 2. Hand sanitisers to be been placed in readily accessible locations. 3. A formal training program implemented to cover risks, symptoms and control measures. 4.All employees to receive awareness training on COVID-19 and personal hygiene (Toolbox talks)
Transportation of workers to	Workers contracting CV19 due	1.fever, dry cough	1. Adhere to general travel ban by SA Government no overcrowding in the transport 70% load

workplace	to sitting closely with infected colleagues, causing illness and possible death	2.Tiredness, aches and pains sore throat, diarrhoea conjunctivitis, headache loss of taste or smell, a rash on skin, or discolouration of fingers or toes	capacity 2. Social Distancing policy implemented. All work areas and activities been revaluated for the possibility of implementing social distancing (no handshaking, deferring large meetings etc.) 3.Relevant PPE to be issued Clean and disinfect objects that are regularly touched 4.CV19 Information posters placed in accessible locations in the workplace 5.All employees and visitors, to receive induction training
Change rooms and dining facility	A worker catches CV19 because a colleague continues working despite being unwell, causing further spread of disease and possible death	1.fever, dry cough 2.Tiredness, aches and pains sore throat, diarrhoea conjunctivitis, headache loss of taste or smell, a rash on skin, or discolouration of fingers or toes	1.decontamination of all facility regularly and provide hygiene requirements (handwashing etc.) and 2.CV19 Information posters placed in accessible locations in the workplace 3.Relevant PPE to be issued Clean and disinfect objects that are regularly touched 4. Provision of hand sanitisers, paper towel, soap and water for employee's onsite. 5. Hand sanitizers should be strategically placed at entrances and common areas. 6. Dining facilities and change rooms onsite be arranged to allow for half a meter physical distancing.
First Aid Training	Workers exposed to CV19 due to providing First Aid in the workplace or during CPR	1.fever, dry cough 2.Tiredness, aches and pains sore throat, diarrhoea conjunctivitis, headache loss of taste or smell, a rash on skin, or discolouration of fingers or toes	1.Proper training of First Aid staff 2.Use of correct equipment while giving First Aid 3.Maintaining proper mannequin hygiene 4.Relevant PPE to be issued Clean and disinfect objects that are regularly touched

RISK PROFILE

Project:	DEPARTMENT OF HEALTH: ST Andrews hospital							
REF NO		RISK ASSESSOR		REVISION	00	DATE	28 February 2022	
Likelihood		Consequence		RISK VALUE= LIKELYHOOD X CONSEQUENCE		RISK RANKING		
Rare	1	Insignificant	1			0-5	1	
Unlikely	2	Minor	2			6-10	2	
Possible	3	Moderate	3			11-16	3	
Likely	4	Major	4			17-20	4	
Almost certain	5	Severe	5			21-25	5	
RISK RANKING IN TERMS OF PRIORITY ⇨		L		M		H		

Pure risk


Residual Risk
Total Risk Ranking
100
95
90
85
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1
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20

Health & Safety Bill of Quantities					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1	Hi Visibility conti-suit	Annual/ As required or needing replacing			R-
2	Hi- Visibility T-Shirts	Annual/ As required or needing replacing			R-
3	Steel Toe-Capped Safety Boots	Annual/ As required or needing replacing			R-
4	Hi-Visibility Safety Vest	Annual/ As required or needing replacing			R-
5	SABS Approved Hard Hat	Annual/ As required or needing replacing			R-
6	Hi-Viaibility Rain Suits	Annual/ As required or needing replacing			R-
7	Steel Toe Capped Gumboots	Annual/ As required or needing replacing			R-
8	Dust Masks (Stipulate FFP):	Annual/ As required or needing replacing			R-
9	Safety Glasses	Annual/ As required or needing replacing			R-
10	Gloves (Stipulate Type):	Annual/ As required or needing replacing			R-
11	Safety Harnesses	Annual/ As required or needing replacing			R-
12	Other:				R-
13	**Trainings:**				R-
14	Safety Representative Training	Once off			R-
15	First Aider Training	Once off			R-
16	Fire Fighting Training	Once off			R-
17	Legal liability	Once off			R-
18	**H&S Salaries:**				R-
19	CHS Manager	Monthly			R-
20	CHS Officer	Monthly			R-
21	Other:				R-
22	**Specific H&S Items:**				R-
23	Medicals	Pre-placement, Annual & Exit			R-
24	Spill Kit	Once off			R-
25	Accommodation of Traffic as per Client tender BOQ	Once off			R-
26	Inductions	Annual			R-
27	First Aid Kits	Once off			R-
	COVID-19				R-
28	Fire Extinguishers	Once off			R-
29	Ablutions	Once off			R-
30	Barrier Netting	Once off			R-
31	Appointment of AIA for asbestos	Not applicable			R-
32	Asbestos Management plan	Not applicable			R-
33	Asbestos removal by competent asbestos contractor	Not applicable			R-
34	Disposal of products containing asbestos	Not applicable			R-
35	Disposal of hazardous chemicals and contaminated soil	Once off			R-
	scaffoldings				
	Ladders				
36	**Safety Signage:**				R-
37	Construction Boards	Once off			R-
38	Fire Extinguisher	Once off			R-
39	Directional signs	Once off			R-
40	Emergency Assembly point	Once off			R-

41	No Smoking	Once off			R-
42	Ladies and Men's Toilets (Gender sign)	Once off			R-
43	No Naked Flames	Once off			R-
44	waterproofing specialist				R-
45	other				
46					

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Principal Contractor **CHS**

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 7

HEALTH AND SAFETY BILL OF QUANTITIES

HEALTH AND SAFETY IMPLEMENTATION COSTING

Contractor to give a breakdown of his Health and Safety costs on this sheet.

ITEM	DESCRIPTION	UNIT	QUAN-TITY	MONTHS (Indicative)	RATE	AMOUNT
			(a)		(b)	(a) x (b)
1	**MEDICALS**					
1.1	Pre-employment medical	Nr.	-			
1.2	Re-medicals - yearly	Nr.	-			
	TOTAL					
2	**PERSONAL PROTECTIVE EQUIPMENT**					
2.1	Overalls	Nr.				
2.2	Hard Hats	Nr.				
2.3	Safety boots/shoes	Nr.				
2.4	Gloves	Nr.				
2.5	Gumboots steel toe cap	Nr.				
2.6	Safety glasses	Nr.				
2.7	Reflector Bibs	Nr.				
2.8	Barricading Material	M				
2.9	Dust masks	Box 20				
	TOTAL					
3	**FIRE FIGHTING**					
3.1	Fire extinguishers - 4.5Kg	Nr.				
3.2	Surveys - Annual Service	Nr.				
	TOTAL					
4	**HEALTH AND SAFETY PERSONNEL**					
4.1	Safety Manager	Nr.				
4.2	Safety Officer	Nr.				
4.3	Construction Phase Safety, Health, Environmental and Waste Management Plan	Nr.				
	TOTAL					
5	**FACILITIES**					
5.1	Provision of ablution facilities	Nr.				
5.2	Service and maintenance of ablution facilities	Nr.				
5.3	Provision of eating areas	Nr.				
5.4	Cleaning of Lay down and other storage areas	Nr.				
5.5	Wash hand basin	Nr.				
5.6	Hot and Cold running water	Nr.				
5.7	Degreasing & Toilet soap	Nr.				
	TOTAL					
6	**FALL PREVENTION / PROTECTION**					
6.1	Safety harnesses with double lanyards	Nr.				
6.2	Safety harnesses with Scaffold hooks	Nr.				
6.3	Lifelines and vertical fall arrest systems	Nr.				
6.4	Scaffolding – material, erection and inspection (Estimate for project)	Nr.				
6.5	Temporary hand railing material and kick flats	Nr.				
6.6	Chin Straps	Nr.				
	TOTAL					

7	**FIRST AID**					
7.1	Replenishment of boxes and other supplies	Nr				
	TOTAL					
8	**TRAINING**					
8.1	SHE Representative	Nr.				
8.2	First Aid Level 1	Nr.				
8.3	Fire Fighting	Nr.				
	TOTAL					
9	**SIGNAGE**					
9.1	All Signage as required by Law, regulatory, warning and information	Nr.				
9.2	Posters for awareness	Nr.				
	TOTAL					
10	**ELECTRICAL**					
10.1	Replacement of Locks required for lockouts	Nr.				
10.2	Replacement of tags	Nr.				
10.3	Replacement for Permit books	Nr.				
10.4	Replacement of Calipers	Nr.				
	TOTAL					
11	**OTHERS (Project Specific)**					
11.1		Nr.				
	TOTAL					
GRAND TOTAL TO BE CARRIED TO THE PRELIMINARIES AND GENERAL IN BILL OF QUANTITIES						

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 8

BUILDERS LIEN AGREEMENT

WAIVER OF CONTRACTOR'S LIEN

DEFINITIONS

Contractor: _____

Employer: Head: Public Works (KZN Department of Public Works: Province of KwaZulu-Natal)

Agreement: GCC FOR CONSTRUCTION WORKS - SECOND EDITION 2010

Works (description): **DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK**

Site: GPS Co-ordinates for this site is: 30°34'31.3026"S 29°53'23.7078"E

AGREEMENT

The Contractor waives, in favour of the Employer, any lien or right of retention that is or may be held in respect of the Works to be executed on the Site

Thus done and signed at _____ on _____
[Date]

_____ _____
Name of signatory Capacity of signatory

_____ _____
As witness For and on behalf of the contractor who by signature hereof warrants authorisation hereto

KWAZULU-NATAL PROVINCE
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DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 9

GEOTECHNICAL INVESTIGATION REPORT - (IF APPLICABLE)

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 10

ADDITIONAL SPECIFICATION - EPWP

ADDITIONAL SPECIFICATION - EPWP

SL **EMPLOYMENT AND TRAINING OF EPWP BENEFICIARY ON THE EXPANDED PUBLIC WORKS PROGRAMME (EPWP) Infrastructure Projects:**

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SL 01 SCOPE

This project is part of the Expanded Public Works Programme aims to train young people and provide them with practical work experience as part of this programme. Youth aged between 18 and 35 will be recruited and trained in skills relevant to the work to be done on this project. These youth will have to be employed by the contractor as part of this project so that they can gain their work experience on these projects. The training of the youth will be coordinated and implemented by a separate service provider. This service provider will provide the contractor with a list of all the youth and the training each of these youth have received. The Contractor will be required to employ all of these youth for a minimum period of 6 months. Furthermore the Contractor will be required to supervise these youth to ensure that the work they perform is of the required standard. If necessary the contractor's staff will be required to assist and mentor the youth to ensure that they are able to perform the type of work they need to do to the satisfactory standards required. The contractor will not be required to employ all youth in the programme at the same time, but may rotate the youth on the project, as long as all youth are employed for the minimum duration stated earlier.

This specification contains the standard terms and conditions for workers employed in elementary occupations and trained on a Expanded Public Works Programme (EPWP) for the Infrastructure Programme.

SL 02 TERMINOLOGY AND DEFINITIONS

SL 02.01 TERMINOLOGY

(a) EPWP The Code of Good Practice for Expanded Public Works Programmes, which has been gazetted by the Department of Labour, and which provides for special conditions of employment for these EPWP projects. In terms of the Code of Good Practice, the workers on these projects are entitled to formal training, which will be provided by training providers appointed (and funded) by the Department of Labour. For projects of up to six months in duration, this training will cover life-skills and information about other education, training and employment opportunities.

(b) EPWP Expanded Public Works Programme, a National Programme of the government of South Africa, approved by Cabinet.

(c) UYF Umsobumvu Youth Fund.

(d) DOL Department of Labour.

SL 02.02 DEFINITIONS

(a)	"employer"	means the contractor or any party employing the worker / beneficiary under the EPWP Programme.
(b)	"client"	means the Department of Public Works.
(c)	" worker / trainee"	means any person working or training in an elementary occupation on a EPWP.

SL 03 APPLICABLE LABOUR LAWS

In line with the Expanded Public Works Programme (EPWP) policies, the Ministerial Determination, Special Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of labour in government Notice No. R63 of 25 January 2002, of which extracts have been reproduced below in clauses SL 04 shall apply to works described in the scope of work and which are undertaken by unskilled or semi-skilled workers. The Code of Good Practise for Employment and Conditions of Work for Expanded Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of Labour in Government Notice No. R64 of 25 January 2002 shall apply to works described in the scope of work and which unskilled or semi-skilled workers undertake.

SI 04 EXTRACTS FROM MINISTERIAL DETERMINATION REGARDING EPWP

SL 04.01 <u>DEFINITIONS</u>

(a) "department" means any department of the State, implementing agent or contractor;

(b) "employer" means any department that hires workers to work in elementary occupations on a EPWP;

(c) "worker" means any person working in an elementary occupation on a EPWP;

(d) "elementary occupation" means any occupation involving unskilled or semi-skilled work;

(e) "management" means any person employed by a department or implementing agency to administer or execute a EPWP;

(f) "task" means a fixed quantity of work;

(g) "task-based work" means work in which a worker is paid a fixed rate for performing a task;

(h) "task-rated worker" means a worker paid on the basis of the number of tasks completed;

(i) "time-rated worker" means a worker paid on the basis of the length of time worked

(j) "Service Provider" means the consultant appointed by Department to coordinate and arrange the employment and training of labour on EPWP infrastructure projects.

SL 04.02 <u>TERMS OF WORK</u>

(a) Workers on a EPWP are employed on a temporary basis.

(b) A worker may NOT be employed for longer than 24 months in any five-year cycle on a EPWP.

(c) Employment on a EPWP does not qualify as employment and a worker so employed does not have to register as a contributor for the purposes of the Unemployment

SL 04.03 <u>NORMAL HOURS OF WORK</u>

(a) An employer may not set tasks or hours of work that require a worker to work–

(i) more than forty hours in any week
(ii) on more than five days in any week; and
(iii) for more than eight hours on any day.

(b) An employer and a worker may agree that the worker will work four days per week. The worker may then work up to ten hours per day.

(c) A task-rated worker may not work more than a total of 55 hours in any week to complete the tasks (based on a 40-hour week) allocated to him.

Every work is entitled to a daily rest period of at least eight consecutive hours. The daily rest period is measured from the time the worker ends work on one day until the time the worker starts work on the next dav.

SL 04.04 MEAL BREAKS

(a) A worker may not work for more than five hours without taking a meal break of at least thirty minutes duration.

(b) An employer and worker may agree on longer meal breaks.

(c) A worker may not work during a meal break. However, an employer may require a worker to perform duties during a meal break if those duties cannot be left unattended and cannot be performed by another worker. An employer must take reasonable steps to ensure that a worker is relieved of his or her duties during the meal break.

SL 04.05 SPECIAL CONDITIONS FOR SECURITY GUARDS

(a) A security guard may work up to 55 hours per week and up to eleven hours per day.

(b) A security guard who works more than ten hours per day must have a meal break of at least one hour duration or two breaks of at least 30 minutes duration each.

SL 04.06 DAILY REST PERIOD

Every worker is entitled to a daily rest period of at least eight consecutive hours. The daily rest period is measured from the time the worker ends work on one day until the time the worker starts work on the next day.

SL 04.07 WEEKLY REST PERIOD

Every worker must have two days off every week. A worker may only work on their day off to perform work which must be done without delay and cannot be performed by workers during their ordinary hours of work ("emergency work").

SL 04.08 WORK ON SUNDAYS AND PUBLIC HOLIDAYS

(a) A worker may only work on a Sunday or public holiday to perform emergency or security work.

(b) Work on Sundays is paid at the ordinary rate of pay.

(c) A task-rated worker who works on a public holiday must be paid –

(i) the worker's daily task rate, if the worker works for less than four hours;

(ii) double the worker's daily task rate, if the worker works for more than four hours.

(d) A time-rated worker who works on a public holiday must be paid –

(i) the worker's daily rate of pay, if the worker works for less than four hours on the public holiday;

(ii) double the worker's daily rate of pay, if the worker works for more than four hours on the public holiday.

SL 04.09 SICK LEAVE

(a) Only workers who work four or more days per week have the right to claim sick-pay in terms of this clause.

(b) A worker who is unable to work on account of illness or injury is entitled to claim one day's paid sick leave for every full month that the worker has worked in terms of a

(c) A worker may accumulate a maximum of twelve days' sick leave in a year.

(d) Accumulated sick-leave may not be transferred from one contract to another contract.

(e) An employer must pay a task-rated worker the worker's daily task rate for a day's sick leave.

(f) An employer must pay a time-rated worker the worker's daily rate of pay for a day's sick leave.

(g) An employer must pay a worker sick pay on the worker's usual payday.

(h) Before paying sick-pay, an employer may require a worker to produce a certificate stating that the worker was unable to work on account of sickness or injury if the worker is –

(i) absent from work for more than two consecutive days; or

(ii) absent from work on more than two occasions in any eight-week period.

(i) A medical certificate must be issued and signed by a medical practitioner, a qualified nurse or a clinic staff member authorised to issue medical certificates indicating the duration and reason for incapacity.

(j) A worker is not entitled to paid sick-leave for a work-related injury or occupational disease for which the worker can claim compensation under the Compensation for Occupational Injuries and Diseases Act.

SL 04.10 MATERNITY LEAVE

(a) A worker may take up to four consecutive months' unpaid maternity leave.

(b) A worker is not entitled to any payment or employment-related benefits during maternity leave.

(c) A worker must give her employer reasonable notice of when she will start maternity leave and when she will return to work.

(d) A worker is not required to take the full period of maternity leave. However, a worker may not work for four weeks before the expected date of birth of her child or for six weeks after the birth of her child, unless a medical practitioner, midwife or qualified nurse certifies that she is fit to do so.

(e) A worker may begin maternity leave –

(i) four weeks before the expected date of birth; or

(ii) on an earlier date –

(1) if a medical practitioner, midwife or certified nurse certifies that it is necessary for the health of the worker or that of her unborn child; or

(2) if agreed to between employer and worker; or

(iii) on a later date, if a medical practitioner, midwife or certified nurse has certified that the worker is able to continue to work without endangering her health.

(f) A worker who has a miscarriage during the third trimester of pregnancy or bears a stillborn child may take maternity leave for up to six weeks after the miscarriage or stillbirth.

(g) A worker who returns to work after maternity leave, has the right to start a new cycle of twenty-four months employment, unless the EPWP on which she was employed has ended.

SL 04.11 FAMILY RESPONSIBILITY LEAVE

(a) Workers, who work for at least four days per week, are entitled to three days paid family responsibility leave each year in the following circumstances -

(i) when the employee's child is born;

(ii) when the employee's child is sick;

(iii) in the event of the death of –

(1) the employee's spouse or life partner

(2) the employee's parent, adoptive parent, grandparent, child, adopted child, grandchild or sibling

SL 04.12 STATEMENT OF CONDITIONS

(a) An employer must give a worker a statement containing the following details at the start of employment –

(i) the employer's name and address and the name of the EPWP;

(ii) the tasks or job that the worker is to perform;

(iii) the period for which the worker is hired or, if this is not certain, the expected duration of the contract;

(iv) the worker's rate of pay and how this is to be calculated;

(v) the training that the worker may be entitled to receive during the EPWP.

(b) An employer must ensure that these terms are explained in a suitable language to any employee who is unable to read the statement.

(c) An employer must supply each worker with a copy of the relevant conditions of employment contained in this specification.

(d) An employer must enter into a formal contract of employment with each employee. A copy of a pro-forma is attached at the end of this specification.

SL 04.13 KEEPING RECORDS

(a) Every employer must keep a written record of at least the following –

(i) the worker's name and position;

(ii) in the case of a task-rated worker, the number of tasks completed by the worker;

(iii) in the case of a time-rated worker, the time worked by the worker;

(iv) payments made to each worker.

(b) The employer must keep this record for a period of at least three years after the completion of the EPWP.

SL 04.14 PAYMENT

(a) A task-rated worker will only be paid for tasks that have been completed.

(b) An employer must pay a task-rated worker within five weeks of the work being completed and the work having been approved by the manager or the contractor having submitted an invoice to the employer. Payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.

(c) A time-rated worker will be paid at the end of each month and payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.

(d) Payment in cash or by cheque must take place –

(i) at the workplace or at a place agreed to by at least 75% of the workers; and

(ii) during the worker's working hours or within fifteen minutes of the start or finish of work;

(e) All payments must be enclosed in a sealed envelope which becomes the property of the worker.

(f) An employer must give a worker the following information in writing –

(i) the period for which payment is made;

(ii) the number of tasks completed or hours worked;

(iii) the worker's earnings;

(iv) any money deducted from the payment;

(v) the actual amount paid to the worker.

(g) If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it.

(h) If a worker's employment is terminated, the employer must pay all monies owing to that worker within one month of the termination of employment.

SL 04.15 DEDUCTIONS

(a) An employer may not deduct money from a worker's payment unless the deduction is required in terms of a law.

(b) An employer must deduct and pay to the SA Revenue Services any income tax that the worker is required to pay.

(c) An employer who deducts money from a worker's pay for payment to another person must pay the money to that person within the time period and other requirements specified in the agreement law, court order or arbitration award concerned.

(d) An employer may not require or allow a worker to –

(i) repay any payment except an overpayment previously made by the employer by mistake;

(ii) state that the worker received a greater amount of money than the employer actually paid to the worker; or

(iii) pay the employer or any other person for having been employed.

SL 04.16 HEALTH AND SAFETY

(a) Employers must take all reasonable steps to ensure that the working environment is healthy and safe and that all legal requirements regarding health and safety are strictly adhered to.

(b) A worker must:

(i) work in a way that does not endanger his/her health and safety or that of any other person;

(ii) obey any health and safety instruction;

(iii) obey all health and safety rules;

(iv) use any personal protective equipment or clothing issued by the employer;

(v) report any accident, near-miss incident or dangerous behaviour by another person to their employer or manager.

SL 04.17 COMPENSATION FOR INJURIES AND DISEASES

(a) It is the responsibility of employers to arrange for all persons employed on a EPWP to be covered in terms of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993.

(b) A worker must report any work-related injury or occupational disease to their employer or manager.

(c) The employer must report the accident or disease to the Compensation Commissioner.

(d) An employer must pay a worker who is unable to work because of an injury caused by an accident at work 75% of their earnings for up to three months. The employer will be refunded this amount by the Compensation Commissioner. This does NOT apply to injuries caused by accidents outside the workplace such as road accidents or accidents at home.

SL 04.18 TERMINATION

(a) The employer may terminate the employment of a worker provided he has a valid reason and after following existing termination procedures.

(b) A worker will not receive severance pay on termination.

(c) A worker is not required to give notice to terminate employment. However, a worker who wishes to resign should advise the employer in advance to allow the employer to find a replacement.

(d) A worker who is absent for more than three consecutive days without informing the employer of an intention to return to work will have terminated the contract. However, the worker may be re-engaged if a position becomes available for the balance of the 24-month period.

(e) A worker who does not attend required training events, without good reason, will have terminated the contract. However, the worker may be re-engaged if a position becomes available for the balance of the 24-month period.

SL 04.19 CERTIFICATE OF SERVICE

(a) On termination of employment, a worker is entitled to a certificate stating –

(i) the worker's full name;
(ii) the name and address of the employer;
(iii) the SPWP on which the worker worked;
(iv) the work performed by the worker;
(v) any training received by the worker as part of the EPWP;
(vi) the period for which the worker worked on the EPWP;
(vii) any other information agreed on by the employer and worker.

SL 05 EMPLOYER'S RESPONSIBILITIES

The employer shall adhere to the conditions of employment as stipulated in the *Code of Good Practice for Employment and Conditions of Work for Expanded Public Works Programmes*. Over and above the conditions stipulated above, he shall be responsible to:

(a) formulate and design a contract between himself/ herself and each of the recruited EPWP beneficiary, ensuring that the contract does not contravene any of the Acts stipulated in South African Law, e.g. Basic Conditions of Employment Act, etc. (A copy of a pro-forma contract is attached at the end of this specification);

(b) screen and select suitable candidates for employment from the priority list of EPWP beneficiary provided by the Umsobumvu Youth Fund (UYF);

(c) ensure that the recruited EPWP beneficiary are made available to receive basic life skills training which will be conducted and paid for by the Umsobumvu Youth Fund;

(d) ensure that all EPWP beneficiary receive instruction on safety on site prior to them commencing with work on site;

(e) ensure that all EPWP beneficiary are covered under workmen's compensation for as long as they are contracted to the contractor. Payment to the Compensation Commissioner shall be the responsibility of the contractor;

(f) assist in the identification and assessment of potential EPWP beneficiary to undergo advanced technical training in respective trades;

(g) test and implement strict quality control and to ensure that the health and safety regulations are adhered to;

(h) provide all EPWP beneficiary with the necessary protective clothing as required by law for the specific trades that they are involved in.

(i) provide overall supervision and day-to-day management of EPWP beneficiary and/or sub-contractors; and

(j) ensure that all EPWP beneficiary are paid their wages on time through a pre-agreed payment method as stipulated in the contract with the EPWP beneficiary.

SL 06 PLACEMENT OF RECRUITED EPWP BENEFICIARY

Employers will be contractually obliged to:

(a) employ EPWP beneficiary from targeted social groups from the priority list provided by the Service Provider/ Umsobumvu Youth Fund.

(b) facilitate on-the-job training and skills development programmes for the EPWP beneficiary;

(c) achieve the following minimum employment targets:

(i) 55% people between the ages of 18 and 35

(ii) 55% women;

(iii) 2% people with disabilities.

(d) brief EPWP beneficiary on the conditions of employment as specified in sub clause SL 04.09 above;

(e) enter into a contract with each EPWP beneficiary, which contract will form part of the Employment Agreement;

(f) allow EPWP beneficiary the opportunity to attend life skills training through DOL. This shall be arranged at the beginning of the contract;

(g) ensure that payments to EPWP beneficiary are made as set out in sub clauses SL 04.14 and SL 04.15 above.

(h) set up of personal profile files as prescribed by EPWP beneficiary and as set out in sub clause SL 04.13 above.

(i) in addition to (h)
- a copy of the I.D;
- qualifications;
- career progress;
- EPWP Employment Agreement, and
- list of small trade tools;

must be included in the EPWP beneficiary's personal profile file.

SL 07 TRAINING OF EPWP BENEFICIARY

Three types of training are applicable, namely

- Life skills;
- On the job training and
- Technical Skills training.

Training will be implemented by training instructors accredited by DOL and/or CETA :

- EPWP beneficiary shall be employed on the projects for an average of 6 months.
- EPWP beneficiary shall be deployed on projects in the vicinity of their homes. The same arrangements as for other workers regarding accommodation, subsistence and travel shall be applicable to EPWP beneficiary.

(a) Life skills training

All EPWP beneficiary are entitled to undergo life skills training. Training of this module will be flexible enough to meet the needs of the employer. Training should take place immediately after site hand-over and during the period of site establishment and pre-planning before actual construction starts, alternatively this will be spread over the duration of the contract period. The contractor will be required to work closely with the person to schedule the training sessions so that the timing of the training is aligned with the contractors work schedule and his demand for workers.

(b) On-the job training

The Employer shall provide EPWP beneficiary with on-the-job training to enable them to fulfil their employment requirements. The employer shall also be expected to closely monitor the job performance of EPWP beneficiary and shall identify potential EPWP beneficiary for skills development programmes.

(c) Technical skills training
The Employer shall assist in identifying EPWP beneficiary for further training. These EPWP beneficiary will undergo further technical training to prepare them for opportunities as semi-skilled labourers.

Such training will comprise of an off-site theoretical component and practical training on-site. The contractor will be responsible for on-site practical work under his supervision. EPWP beneficiary who graduate from the first phase of the training programme will be identified and given opportunities to register for skills development programmes. These can ultimately result in a accredited qualification. The programme will consist of theoretical instruction away from the construction site as well as on-site practical work under the supervision of the employer. Candidates will be entitled to employment to complete all training modules.

SL 08 BENEFICIARY (EPWP BENEFICIARY) SELECTION CRITERIA

SL 08.01 PREAMBLE

The *Code of Good Practise for Employment and Conditions of Work for Expanded Public Works Programmes* encourages:

- optimal use of locally-based labour in a Expanded Public Works Programme (EPWP);
- a focus on targeted groups which consist of namely youth, consisting of women, female-headed households, disabled and households coping with HIV/AIDS; and
- the empowerment of individuals and communities engaged in a SPWP through the provision of training.

SL 08.02 BENEFICIARY (EPWP BENEFICIARY) SELECTION CRITERIA

(a) The EPWP beneficiary of the programmes should preferably be non-working individuals from the most vulnerable sections of disadvantaged communities who do not receive any social security pension income. The local community must, through all structures available, be informed of and consulted about the establishment of any EPWP

(b) In order to spread the benefit as broadly as possible in the community, a maximum of one person per household should be employed, taking local circumstances into account.

(c) Skilled artisans from other areas may be employed if they have skills that are required for a project and there are not enough persons in the local communities who have those skills or who could undergo appropriate skills training. However, this should not result in more than 20% of persons working on a programme not being from local communities.

(d) Programmes should set participation targets for employment with respect to youth, single male- and female-headed households, women, people with disabilities, households coping with HIV/AIDS, people who have never worked, and those in long-term unemployment.

(e) The proposed targets as set out in sub clause SL 06 (c)

- 55% youth from 18 to 35 years of age;
- 60% women;
- 2% disabled.

SL 09 CONTRACTUAL OBLIGATIONS IN RELATION TO YOUTH LABOUR

The EPWP beneficiary to be employed in the programme (EPWP) shall be directly contracted to the employer. Over and above the construction and project management responsibilities, the employer will be expected to perform the tasks and responsibilities as set out in clause SL 05 above.

SL 10 PROVINCIAL RATES OF PAY

It is stipulated that youth workers on the EPWP receive a minimum of R 1 000 per month whilst working and R 600 per month whilst on training in ALL provinces. Should EPWP beneficiary be attending training whilst employed by the contractor, the contractor will still be responsible for payment to the EPWP beneficiary whilst at training.

SL 11 MEASUREMENTS AND PAYMENT

The number of EPWP beneficiary specified for this contract that will receive life skills training is 26 and technical training is 26

SL 11.01 PAYMENT FOR TRAINING OF EPWP BENEFICIARY (TARGET:- 26 EPWP BENEFICIARY)

SL 11.01.01 Skills development and Technical training for EPWP beneficiary for an average of 10 days .....(Prov.Sum).....Unit: R/EPWP beneficiary

The above item is only applicable if DoL does not fund the Technical Training PRIOR to site handover.

SL 11.01.02 Penalty due to not meeting the target as in SL 11.01.01.....Unit: EPWP beneficiary

LESS R 2000 per EPWP beneficiary

SL 11.02 PAYMENT FOR TRAVELLING AND ACCOMMODATION DURING OFF-SITE TRAINING

SL 11.02.01 Life skills training for 26 days:

01 Travelling (based on 50 km/EPWP beneficiary) .....Unit: km

02 Accommodation.....(Prov.Sum).....Unit: R/EPWP beneficiary

03 Profit and attendance..... Unit: %

SL 11.02.02 Skilled development and Technical training:

01 Travelling (based on 50 km/EPWP beneficiary).....Unit: km

02 Accommodation.....(Prov.Sum)....Unit: R/EPWP beneficiary

03 Profit and attendance ..... Unit: %

The units of measurement for sub items SL 11.02.01 (01) and SL 11.02.02 (01) above shall be the distance travelled in km by the EPWP beneficiary trained off site. The tendered rate shall include full compensation to safely transport the youth workers to and from the training venue/s.

The unit of measurement for sub items SL 11.02.01 (02) and SL 11.02.02 (02) above shall be the amounts in Rand expended for accommodation and daily meal allowances for the EPWP beneficiary trained off site that must be arranged by the contractor. Amounts quoted shall be corrected according to re-measurement based on actual invoices.

The tendered percentages under sub items SL 11.02.01 (03) and SL 11.02.02 (03) will be paid to the contractor on the value of each payment pertaining to the accommodation and advance meal allowances to cover his expenses in this regard.

SL 11.03 ALTERNATIVE WORKERS FOR THE PERIOD OF OFF-SITE TRAINING

SL 11.03.01 Life skills training for 26 days ..... Unit: worker-days

SL 11.03.02 Skilled development and Technical training for EPWP beneficiary for (.....) days..... Unit: worker-days

The unit of measurement shall be the number of EPWP beneficiary replaced while in training multiplied by the number of days absent from the site.

The rates tendered shall include full compensation for additional replacement labour during periods of off-site training.

SL 11.04 EMPLOYMENT OF EPWP BENEFICIARY

SL 11.04.01 Employment of EPWP beneficiary.....(Prov.Sum)¼.Unit: R/ worker-month

SL 11.04.02 Employment of EPWP beneficiary.....(Prov.Sum)¼.Unit: R/ worker-month

The unit of measurement shall be the number of EPWP beneficiary at the statutory labour rates of R ..... multiplied by the period employed in months and the rate tendered shall include full compensation for all costs associated with the employment of EPWP beneficiary and for complying with the conditions of contract. The cost for the training shall be excluded from this item. This item is based on 6 months appointment for EPWP beneficiary.

SL 11.05 PROVISION OF EPWP DESIGNED OVERALLS TO EPWP BENEFICIARY

SL 11.05.01 Supply EPWP designed overalls to EPWP beneficiary ..... (Prov.Sum).....Unit: R

EPWP beneficiary overalls should be orange (top and bottom) as per EPWP specification with the exception of Correctional Services contracts where the EPWP beneficiary top would be blue and the bottom orange.

SL 11.05.02 Profit and attendance..... Unit: %

An amount has been provided in the Schedule of Quantities under sub item SL 10.05.01 for the supply of EPWP designed overalls, as per the specification provided by the EPWP unit, arranged by the Service Provider. The Engineer will have sole authority to spend the amounts or part thereof. The tendered percentage under sub items SL 10.05.02 will be paid to the contractor on the value of each payment pertaining to the supply of overalls to cover his expenses in this regard.

SL 11.06 PROVISION OF SMALL TOOLS FOR EPWP BENEFICIARY

SL 11.06.01 Provide all EPWP beneficiary with prescribed tools for their respective trades. Specification for the mentioned tools to be provided by the EPWP Service Provider. These tools will become the property of the EPWP beneficiary after the completion of the programme.....(Prov.Sum)....Unit: **R 500-00** /youth worker

SL 11.06.02 Profit and attendance..... Unit: %

SL 11.07 APPOINTMENT OF EPWP BENEFICIARY TEAM LEADER/S

SL 11.07.01 Appointment of (_____) EPWP beneficiary team leader/s for the duration of the contract.....(Prov.Sum)..... Unit: R / EPWP beneficiary team leader

The EPWP beneficiary Team Leader will act as CLO/PLO to facilitate the project work between the EPWP beneficiary and the contractor. Umsobumvu Youth Fund can assist with the sourcing of EPWP beneficiary Team Leader for employment by the contractor.

SL 11.08 LIAISON WITH SERVICE PROVIDER .....Unit: hours

The tendered rate shall include full compensation for the cost of liaising with the Service Provider and Social Facilitators on all issues regarding the works.

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PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 11

EPWP BOQ

PAGE NO	ITEM NO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1		**BILL NO 2**				
1		**EMPLOYMENT AND TRAINING OF LABOUR ON THE EPWP BENEFICIARY INFRASTRUCTURE PROJECTS**				
1		**PREAMBLES**				
1		Tenderers are advised to study the Additional Specification SL: Employment and training of Labour on the Expanded Public Works Programme (EPWP) Infrastructure Projects as bound elsewhere in the Bills of Quantities and then price this Bill accordingly				
1		**TRAINING OF EPWP BENEFICIARY**				
1		(TARGET: 26 EPWP BENEFICIARY)				
1		Skills development and Technical training:				
1	1	Skills development and technical training for EPWP beneficiary for an average of 10 days (ref. SL11.01.01)	Item	1		
1	2	Penalty due to not meeting the target as in SL 11.01.02	Y/Work	R 2 000.00		
1		**TRAVELLING AND ACCOMMODATION DURING OFF SITE TRAINING:**				
1		Life skills training for 26 days (ref. SL 11.02.01)				
1	3	Travelling (based on 50km/EPWP beneficiary)	km	1300		
1	4	Profit and attendance on Items 1, 2 & 3	%			
1		**EMPLOYMENT OF EPWP BENEFICIARY**				
1	5	Employment of EPWP beneficiary (12 youth) [Main Building]	Item	1		
1		The unit of measurement shall be the number of EPWP beneficiary at the statutory labour rates of R 209/day multiplied by the period employed in months and the rate tendered shall include full compensation for all costs associated with the employment of EPWP beneficiary and for complying with the conditions of contract. The cost for training shall be excluded from this item. This item is based on 12 months appointment for EPWP beneficiary				
1	6	Employment of EPWP beneficiary(5 youth) [Guard House]	Item	1		
		TOTAL CARRIED TO SUMMARY				

			UNIT	QUANTITY	RATE	AMOUNT
2		The unit of measurement shall be the number of EPWP beneficiary at the statutory labour rates of R 209/day multiplied by the period employed in months and the rate tendered shall include full compensation for all costs associated with the employment of EPWP beneficiary and for complying with the conditions of contract. The cost for training shall be excluded from this item. This item is based on 4 months appointment for EPWP beneficiary				
2	7	Employment of EPWP beneficiary (9 youth) [External Works]	Item	1		
2		The unit of measurement shall be the number of EPWP beneficiary at the statutory labour rates of R 209/day multiplied by the period employed in months and the rate tendered shall include full compensation for all costs associated with the employment of EPWP beneficiary and for complying with the conditions of contract. The cost for training shall be excluded from this item. This item is based on 8 months appointment for EPWP beneficiary				
2		**PROVISION OF EPWP DESIGNED OVERALLS TO YOUTH WORKERS**				
2	8	Supply EPWP designed overalls to EPWP beneficiary (ref. SL 11.05.01) for 26 workers	Item	1		
2	9	Profit and attendance on Items 5 - 8 (ref. SL 11.05.02)	%	7.5		
2		**PROVISION OF SMALL TOOLS FOR EPWP BENEFICIARY**				
2	10	Supply of small tools to EPWP beneficiary. Specification to be supplied by the EPWP-NYS Serviced Provider for the respective trades (ref. SL 11.06.01) for 26 workers	Item	1		
2	11	Profit and attendance (ref. SL 11.06.02)	%	7.5		
2		**APPOINTMENT OF YOUTH TEAM LEADERS**				
2	12	Appointment of EPWP beneficiary Team Leaders for the duration of the contract (ref. SL 11.07)	Item	1		
2	13	Liaison with Service Provider (ref. SL 11.08)	Hrs	30		
2	14	Profit and attendance on Items 12 & 13	%	7.5		
		FINAL TOTAL CARRIED TO PRELIMINARY AND GENERAL IN BILL OF QUANTITIES				

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ANNEXURE 12

SCOPE OF WORKS IN RESPECT OF WORK RELATING TO EPWP

SCOPE OF WORKS IN RESPECT OF WORK RELATING TO THE EXTENDEND PUBLIC WORKS PROGRAMME (EPWP)			
Project title:	**DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK**		
Project Code:	**075988**	EPWP NO:	**N/A**

Introductory notes:

1. The works, or parts of the works will be constructed using labour-intensive methods only in terms of this specification. The use of plant to provide such works, other than plant specifically provided for in the scope of work, is a variation to the contract. The items marked with the letters **LI** are not necessarily an exhaustive list of all the activities which must be done by hand, and this clause does not over-ride any of the requirements in the generic labour intensive specification in the Scope of Works.
2. Payment for items which are designated to be constructed labour-intensively (either in this schedule or in the Scope of Works) will not be made unless they are constructed using labour-intensive methods. Any unauthorised use of plant to carry out work which was to be done labour-intensively will not be condoned and any works so constructed will not be certified for payment.

DESCRIPTION OF THE WORKS

Employer's objectives

The employer's objectives are to deliver public infrastructure using labour-intensive methods in accordance with EPWP Guidelines.

Labour-intensive works

Labour-intensive works comprise the activities described in the Labour-Intensive Specification. Labour-intensive works shall be constructed/maintained using local workers who are temporarily employed in terms of the scope of work.

LABOUR-INTENSIVE COMPETENCIES OF SUPERVISORY AND MANAGEMENT STAFF

Contractors shall only engage supervisory and management staff in labour-intensive works that have completed the skills programme including Foremen/ Supervisors at NQF level 4 "National Certificate: Supervision of Civil Engineering Construction Processes" and Site Agent/ Manager at NQF level 5 "Manage Labour-Intensive Construction Processes" or equivalent QCTO qualifications (See Appendix C). at NQF outlined in Table 1. (See GUIDELINES FOR THE IMPLEMENTATION OF LABOUR-INTENSIVE INFRASTRUCTURE PROJECTS UNDER THE EXPANDED PUBLIC WORKS PROGRAMME (EPWP) -THIRD EDITION 2015)

Emerging contractors shall have personally completed, or be registered on a skills programme for the NQF level 2 unit standard. All other site supervisory staff in the employ of emerging contractors must have completed, or be registered on a skills programme for the NQF level 2 unit standards or NQF level 4 unit standards. Table 1: Skills programme for supervisory and management staff.

Table 1: Skills programme for supervisory and management staff

Personnel	NQF level	Unit standard titles	Skills programme description
Team leader / supervisor	2	Apply Labour-Intensive Construction Systems and Techniques to Work Activities	This unit standard must be completed, and
		Use Labour-Intensive Construction Methods to Construct and Maintain Roads and Storm water Drainage	any one of these 3 unit standards
		Use Labour-Intensive Construction Methods to Construct and Maintain Water and Sanitation Services	
		Use Labour-Intensive Construction Methods to Construct, Repair and Maintain structures	
Personnel	**NQF level**	**Unit standard titles**	**Skills programme description**
Foreman/supervisor	4	Implement Labour-Intensive Construction Systems and Techniques	This unit standard must be completed, and
		Use Labour-Intensive Construction Methods to Construct and Maintain Roads and Storm water Drainage	any one of these 3 unit standards
		Use Labour-Intensive Construction Methods to Construct and Maintain Water an Sanitation Services	
		Use Labour-Intensive Construction Methods to Construct, Repair and Maintain structures	
Site Agent /Manager (i.e. the contractor's most senior representative that is resident on the site)	5	Manage Labour-Intensive Construction Processes	Skills Programme against this single unit standard
Details of these skills programmes may be obtained from the CETA ETQA manager (e-mail :gerard@ceta.co.za , tel: 011-265 5900)			

EMPLOYMENT OF UNSKILLED AND SEMI-SKILLED WORKERS IN LABOUR-INTENSIVE WORKS

1.1 Requirements for the sourcing and engagement of labour.

1.1.1 Unskilled and semi-skilled labour required for the execution of all labour-intensive works shall be engaged strictly in accordance with prevailing legislation and SANS 1914-5, Participation of Targeted Labour.

1.1.2 The rate of pay set for the SPWP per task or per day will be an acceptable rate determined by the Department of Labour.

1.1.3 Tasks established by the contractor must be such that:

a) the average worker completes 5 tasks per week in 40 hours or less; and
b) the weakest worker completes 5 tasks per week in 55 hours or less.

1.1.4 The contractor must revise the time taken to complete a task whenever it is established that the time taken to complete a weekly task is not within the requirements of 1.1.3.

1.1.5 The Contractor shall, through all available community structures, inform the local community of the labour-intensive

a) where the head of the household has less than a primary school education;
b) that have less than one full time person earning an income;
c) where subsistence-agriculture is the source of income.
d) that who are not in receipt of any social security pension income

1.1.6 The Contractor shall endeavour to ensure that the expenditure on the employment of unskilled and semi-skilled workers is in the following proportions:

a) 60% women;
b) 55% youth who are between the ages of 18 and 35; and
c) 2% on persons with disabilities.

1.2 Specific provisions pertaining to SANS 1914-5

1.2.1 Definitions

Targeted labour: Unemployed persons who are employed as local labour on the project.

1.2.2 Contract participation goals

1.2.2.1 There is no specified contract participation goal for the contract. The contract participation goal shall be measured in the performance of the contract to enable the employment provided to targeted labour to be quantified.

1.2.2.2 The wages and allowances used to calculate the contract participation goal shall, with respect to both time-rated and task rated workers, comprise all wages paid and any training allowance paid in respect of agreed training programmes.

1.2.3 Terms and conditions for the engagement of targeted labour

Further to the provisions of clause 3.3.2 of SANS 1914-5, written contracts shall be entered into with targeted labour.

1.2.4 Terms and conditions for the engagement of targeted labour

Further to the provisions of clause 3.3.2 of SANS 1914-5, written contracts shall be entered into with targeted labour.

1.2.5 Variations to SANS 1914-5

1.2.5.1 The definition for net amount shall be amended as follows:
Financial value of the contract upon completion, exclusive of any value added tax or sales tax which the law requires the employer to pay the contractor.

1.2.5.2 The schedule referred to in 5.2 shall in addition reflect the status of targeted labour as women, youth and persons with disabilities and the number of days of formal training provided to targeted labour.

1.3 Training of targeted labour

1.3.1 The contractor shall provide all the necessary on-the-job training to targeted labour to enable such labour to master the basic work techniques required to undertake the work in accordance with the requirements of the contract in a manner that does not compromise worker health and safety.

1.3.2 The cost of the formal training of targeted labour, will be funded by the local office of the Department of Labour. This training will take place as close to the project site as practically possible. The contractor must access this training by informing the relevant regional office of the Department of Labour in writing, within 14 days of being awarded the contract, of the likely number of persons that will undergo training and when such training is required. The Employer and the Department of Public Works (Fax: 012 3258625/ EPWP Unit, Private Bag X65, Pretoria 0001) must be furnished with a copy of this request.

1.3.3 The contractor shall do nothing to dissuade targeted labour from participating in training programmes and shall take all reasonable steps to ensure that each beneficiary is provided with two days of formal training for every 22 days worked.

1.3.4 An allowance equal to 100% of the task rate or daily rate shall be paid by the contractor to workers who attend formal training, in terms of the above.

1.3.5 Proof of compliance with the above requirements must be provided by the Contractor to the Employer prior to submission of the final payment certificate.

GENERIC LABOUR-INTENSIVE SPECIFICATION

1 Scope

This specification establishes general requirements for activities which are to be executed by hand involving the following:

a) trenches having a depth of less than 1.5 metres
b) storm water drainage
c) low-volume roads and sidewalks

2 Precedence

Where this specification is in conflict with any other standard or specification referred to in the Scope of Works to this Contract, the requirements of this specification shall prevail.

3 Hand excavateable material

Hand excavateable material is material:

a) Granular materials:

i) whose consistency when profiled may in terms of table 1 be classified as very loose, loose, medium dense, or dense; or

ii) where the material is a gravel having a maximum particle size of 10mm and contains no cobbles or isolated boulders, no more than 15 blows of a dynamic cone penetrometer is required to penetrate 100mm;

b) Cohesive materials:

i) whose consistency when profiled may in terms of table 1 be classified as very soft, soft, firm, stiff and stiff / very stiff; or

ii) where the material is a gravel having a maximum particle size of 10mm and contains no cobbles or isolated boulders, no more than 8 blows of a dynamic cone penetrometer is required to penetrate 100mm;

Note: 1) A boulder, a cobble and gravel is material with a particle size greater than 200mm, between 60 and 200mm.

2) A dynamic cone penetrometer is an instrument used to measure the in-situ shear resistance of a soil comprising a drop weight of approximately 10 kg which falls through a height of 400mm and drives a cone having a maximum diameter of 20mm (cone angle of. 60 degrees with respect to the horizontal) into the material being used.

Table 2: Consistency of materials when profiled

GRANULAR MATERIALS		COHESIVE MATERIALS	
CONSISTENCY	DESCRIPTION	CONSISTENCY	DESCRIPTION
Very loose	Crumbles very easily when scraped with a geological pick.	Very soft	Geological pick head can easily be pushed in as far as the shaft of the handle.
Loose	Small resistance to penetration by sharp end of a geological pick.	Soft	Easily dented by thumb; sharp end of a geological pick can be pushed in 30-40 mm; can be moulded by fingers with some pressure.
Medium dense	Considerable resistance to penetration by sharp end of a geological pick.	Firm	Indented by thumb with effort; sharp end of geological pick can be pushed in upto 10 mm; very difficult to mould with fingers; can just be penetrated with an ordinary hand spade.
Dense	Very high resistance to penetration by the sharp end of a geological pick; requires many blows for excavation.	stiff	Can be indented by thumb-nail; slight indentation produced by pushing geological pick point into soil; cannot be moulded by fingers.
Very dense	High resistance to repeated blows of a geological pick.	Very stiff	Indented by thumb-nail' with difficulty; slight indentation produced by blow of a geological pick point.

4 Trench excavation

All hand excavateable material in trenches having a depth of less than 1,5 metres shall be excavated by hand.

5 **Compaction of backfilling to trenches (areas not subject to traffic)**

Backfilling to trenches shall be placed in layers of thickness (before compaction) not exceeding 100mm. Each layer shall be compacted using hand stampers

a) to 90% Proctor density;

b) such that in excess of 5 blows of a dynamic cone penetrometer (DCP) is required to penetrate 100 mm of the backfill, provided that backfill does not comprise more than 10% gravel of size less than 10mm and contains no isolated boulders, or

c) such that the density of the compacted trench backfill is not less than that of the surrounding undisturbed soil when tested comparatively with a DCP.

6 **Excavation**

All hand excavateable material including topsoil classified as hand excavateable shall be excavated by hand. Harder material may be loosened by mechanical means prior to excavation by hand.

The excavation of any material which presents the possibility of danger or injury to workers shall not be excavated by hand.

7 **Clearing and grubbing**

Grass and small bushes shall be cleared by hand.

8 **Shaping**

All shaping shall be undertaken by hand.

9 **Loading**

All loading shall be done by hand, regardless of the method of haulage.

10 **Haul**

Excavation material shall be hauled to its point of placement by means of wheelbarrows where the haul distance is not greater than 150 m.

11 **Offloading**

All material, however transported, is to be off-loaded by hand, unless tipper-trucks are utilised for haulage.

12 **Spreading**

All material shall be spread by hand.

13 **Compaction**

Small areas may be compacted by hand provided that the specified compaction is achieved.

14 **Grassing**

All grassing shall be undertaking by sprigging, sodding, or seeding by hand.

15 **Stone pitching and rubble concrete masonry**

All stone required for stone pitching and rubble concrete masonry, whether grouted or dry, must be collected, loaded, off loaded and placed by hand.

Sand and stone shall be hauled to its point of placement by means of wheelbarrows where the haul distance is not greater than 150m.

Grout shall be mixed and placed by hand.

16 **Manufactured Elements**

Elements manufactured or designed by the Contractor, such as manhole rings and cover slabs, precast concrete planks and pipes, masonry units and edge beams shall not individually, have a mass of more than 320kg. In addition, the items shall be large enough so that four workers can conveniently and simultaneously acquire a proper handhold on them.

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ANNEXURE 13

EPWP EMPLOYMENT CONTRACT AND EPWP SPECIFICATION/CHECKLIST

(Insert Your Company Logo)

(This shall serve as the cover page on employment contracts for local labour)

EMPLOYMENT AGREEMENT

BETWEEN

[CONTRACTOR NAME].....

AND

[WORKER NAME].....

1. PARTIES

The Parties to this Agreement are -

1.1. Contractor: _____

herein represented by: _____

duly authorised thereto

And

1.2. Mr / Me: _____
[worker's name]

2. DEFINITIONS AND INTERPRETATION

2.1. In this Agreement and any Annexure thereto, unless inconsistent with or otherwise indicated by the context-

"Agreement"	means the contents of this Agreement.
"Company"	means the company that employs the worker
"Department"	means the Department of Public Works
"Worker"	is a person that performs a specific or necessary task or who completes tasks in a certain way
"EPWP"	The Expanded Public Works Programme is a government programme aimed at the alleviation of poverty and unemployment. The programme ensures the full engagement on Labour Intensive Methods of Construction (LIC) to contractors for skills development. The EPWP focuses at reducing unemployment by increasing economic growth by means of improving skills levels through education and training and improving the enabling environment for the industry to flourish.

3. PURPOSE

The purpose of this agreement is to:-

Ensure that the agreement is binding to both the Worker and the Employer.

4. TERMS AND CONDITIONS

- The worker will have no entitlement to the benefits of a full time employee, namely;

  _____

  _____

- The worker should not have the expectation that this contract will be renewed or extended.
- The worker will be subject to all laws, rules, policies, codes and procedures applicable to the;

  _____

- The worker must meet the standards and requirements of the contractor
- The worker must render his/her services during normal working hours of minimum of forty to fifty five hours in any week; which comprise of an eight-hour working day in a five-day week.

5. REMUNERATION

The worker will receive compensation to the amount of R_____00 which must be paid by the 25th or on the last day of each month.

6. ROLES AND RESPONSIBILITIES

6.1 Employer / Worker

- Work for _____ in terms of the period as specified in the employment agreement contract.
- Be available for and participate in all learning and work experience required by the company.
- Comply with workplace policies and procedures.
- Complete any attendance or any written assessment tools supplied by the contractor to record relevant workplace experience.
- Demonstrate willingness to grow and learn through work experience.

  Provide the following documentation to the employer,

  - Certified identity document not longer than 3 months
  - ID size photos
  - Sign employment contract

6.2 Employer

- Employ the worker for a period specified in the agreement.
- Provide the worker with appropriate work based experience in the work environment.
- Facilitate payments of wages / stipends.
- Keep accurate records of workers.
- Where a worker/ learner is disabled, the employer will have to provide in the additional needs e.g. special materials, learning aids and in some cases physical or professional support (such aids remain the property of the employer).
- Keep up to date records of learning and discuss progress with the intern on a regular basis.
- Apply fair disciplinary, grievance and dispute resolution procedures to the worker.
- Prepare an orientation/ induction course to introduce worker/ learner to the workplace and specific workplace requirements.
- Ensure the daily attendance register is signed by the worker.

7. DURATION.

This agreement commences on: _____

and

expires on: _____

8. BREACH.

If either party commits any breach of the terms of this contract (and fails to rectify it within 30 days of receipt of a written notice calling it to do so, then) the other party shall be entitled to terminate the contract or to claim specific performance without prejudice to any of its other legal rights, including its rights to claim damages.

9. CONDITIONS OF EMPLOYMENT

9.1. Meal Breaks

9.1.1 A worker may not work for more than five hours without taking a meal break of at least thirty minutes duration.

9.1.2 An employer and worker may agree on longer meal breaks.

9.1.3 A worker may not work during a meal break. However, an employer may require a worker to perform duties during a meal break if those duties cannot be left unattended and cannot be performed by another worker. An employer must take reasonable steps to ensure that a worker is relieved of his or her duties during the meal break.

9.1.4 A worker is not entitled to payment for the period of a meal break. However, a worker who is paid on the basis of time worked must be paid if the worker is required to work or to be available for work during the meal break.

9.2. Special Conditions for Security Guards (Only applicable to security Guards)

9.2.1 A security guard may work up to 55 hours per week and up to eleven hours per day.

9.2.2 A security guard who works more than ten hours per day must have a meal break of at least one hour or two breaks of at least 30 minutes each.

9.3. Weekly Rest Period

Every worker must have two days off every week. A worker may only work on their day off to perform work which must be done without delay and cannot be performed by workers during their ordinary hours of work ("emergency work").

9.4. Work on Sundays and Public Holidays

9.4.1 A worker may only work on a Sunday or public holiday to perform emergency or security work.

9.4.2 Work on Sundays is paid at the ordinary rate of pay.

9.4.3 A task-rated worker who works on a public holiday must be paid;

(a) the worker's daily task rate, if the worker works for less than four hours;

(b) double the worker's daily task rate, if the worker works for more than four hours.

9.4.4 A time-rated worker who works on a public holiday must be paid

(a) the worker's daily rate of pay, if the worker works for less than four hours on the public holiday;

(b) double the worker's daily rate of pay, if the worker works for more than four hours on the public holiday.

9.5 Sick leave

9.5.1 Only workers who work more than 24 hours per month have the right to claim sick-pay in terms of this clause.

9.5.2 A worker who is unable to work on account of illness or injury is entitled to claim one day's paid sick leave for every full month that the worker has worked in terms of a contract.

9.5.3 A worker may accumulate a maximum of twelve days' sick leave in a year.

9.5.4 Accumulated sick-leave may not be transferred from one contract to another contract.

9.5.5 An employer must pay a task-rated worker the worker's daily task rate for a day's sick leave.

9.5.6 An employer must pay a time-rated worker the worker's daily rate of pay for a day's sick leave.

9.5.7 An employer must pay a worker sick pay on the worker's usual payday.

9.5.8 Before paying sick-pay, an employer may require a worker to produce a certificate stating that the worker was unable to work on account of sickness or injury if the worker is

(a) absent from work for more than two consecutive days; or

(b) absent from work on more than two occasions in any eight-week period.

9.5.9 A medical certificate must be issued and signed by a medical practitioner, a qualified nurse or a clinic staff member authorised to issue medical certificates indicating the duration and reason for incapacity.

9.5.10 A worker is not entitled to paid sick-leave for a work-related injury or occupational disease for which the worker can claim compensation under the Compensation for Occupational Injuries and Diseases Act.

9.6. Maternity Leave

9.6.1 A worker may take up to four consecutive months' unpaid maternity leave.

9.6.2 A worker is not entitled to any payment or employment-related benefits during maternity leave.

9.6.3 A worker must give her employer reasonable notice of when she will start maternity leave and when she will return to work.

9.6.4 A worker is not required to take the full period of maternity leave. However, a worker may not work for four weeks before the expected date of birth of her child or for six weeks after the birth of her child, unless a medical practitioner, midwife or qualified nurse certifies that she is fit to do so.

9.6.5 A worker may begin maternity leave as follows;

(a) four weeks before the expected date of birth; or

(b) on an earlier date

(i) if a medical practitioner, midwife or certified nurse certifies that it is necessary for the health of the worker or that of her unborn child; or

(ii) if agreed to between employer and worker; or

(c) on a later date, if a medical practitioner, midwife or certified nurse has certified that the worker is able to continue to work without endangering her health.

10.6 A worker who has a miscarriage during the third trimester of pregnancy or bears a stillborn child may take maternity leave for up to six weeks after the miscarriage or stillbirth.

9.7. Family responsibility leave

9.7.1 Workers, who work for at least four days per week, are entitled to three days paid family responsibility leave each year in the following circumstances;

(a) when the employee's child is born;

(b) when the employee's child is sick;

(c) in the event of a death of

(i) the employee's spouse or life partner;

(ii) the employee's parent, adoptive parent, grandparent, child, adopted child, grandchild or sibling.

9.8. Keeping Records

9.8.1 Every employer must keep a written record on site for the duration of the project and three (3) year after completion records should consists of at least the following;

(a) the worker's name and position;

(b) copy of an acceptable worker identification

(c) in the case of a task-rated worker the number of tasks completed by the worker;

(d) in the case of a time-rated worker, the time worked by the worker;

(e) payments made to each worker in a form of Proof of Payment, Payroll registers and the acknowledgement of payment receipt signed by the worker.

9.8.2 The employer must keep this record for a period of at least three years after the completion of the EPWP.

9.9. Payment

9.9.1 An employer must pay all wages at least monthly in cash or by cheque or into a bank account.

9.9.2 A worker may not be paid less than the Ministerial Determination wage rate.

9.9.3 A task-rated worker will only be paid for tasks that have been completed.

9.9.4 An employer must pay a task-rated worker within five weeks of the work being completed and the work having been approved by the manager or the contractor having submitted an invoice to the employer.

9.9.5 A time-rated worker will be paid at the end of each month.

9.9.6 Payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.

9.9.7 Payment in cash or by cheque must take place

(a) at the workplace or at a place agreed to by the worker;

(b) during the worker's working hours or within fifteen minutes of the start or finish of work;

(c) in a sealed envelope which becomes the property of the worker.

9.9.8 An employer must give a worker the following information in writing

(a) the period for which payment is made;

(b) the numbers of tasks completed or hours worked;

(c) the worker's earnings;

(d) any money deducted from the payment;

(e) the actual amount paid to the worker.

9.9.9 If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it.

9.9.10 If a worker's employment is terminated, the employer must pay all monies owing to that worker within one month of the termination of employment.

9.10. Inclement weather

If no work has begun on site, and if an employee has reported for work, the employee will be paid for four hours. Should work be stopped after the first four hours, the employee will be paid for the hours worked. Where the employer has given employees notice on the previous working day that no work will be available due to inclement weather, then no payment will be made.

9.11. Deductions

9.11.1 An employer may not deduct money from a worker's payment unless the deduction is required in terms of a law.

9.11.2 An employer must deduct and pay to the SA Revenue Services any income tax that the worker is required to pay.

9.11.3 An employer who deducts money from a worker's pay for payment to another person must pay the money to that person within the time period and other requirements specified in the agreement of Law; court order or arbitration

9.11.4 It is the responsibility of the employers to arrange for all persons employed on a Project to be covered in terms of the Unemployment Insurance Fund Contributions Act, 2002 (Act No. 4 of 2002)

9.11.5 An employer may not require or allow a worker to

(a) repay any payment except an overpayment previously made by the employer by mistake;

(b) state that the worker received a greater amount of money than the employer actually paid to the worker; or

(c) pay the employer or any other person for having been employed.

9.12. Health and Safety

9.12.1 Employers must take all reasonable steps to ensure that the working environment is healthy and safe.

9.12.2 A worker must;

(a) work in a way that does not endanger his/her health and safety or that of any other person;

(b) obey any health and safety instruction;

(c) use any personal protective equipment or clothing issued by the employer;

(d) report any accident, near-miss incident or dangerous behaviour by another person to their employer or manager.

9.13. Compensation for Injuries and Diseases

9.13.1 It is the responsibility of the employers to arrange for all persons employed on a Project to be covered in terms of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993 as amended by COIDA Act 61, 1997.

9.13.2 A worker must report any work-related injury or occupational disease to their employer or manager.

9.13.3 The employer must report the accident or disease to the Compensation Commissioner.

9.13.4 An employer must pay a worker who is unable to work because of an injury caused by an accident at work 75% of their earnings for up to three months. The employer will be refunded this amount by the Compensation Commissioner. This does NOT apply to injuries caused by accidents outside the workplace such as road accidents or accidents at home.

9.14. Termination

9.14.1 The employer may terminate the employment of a worker for good cause after following a fair procedure.

9.14.2 A worker will not receive severance pay on termination.

9.14.3 A worker is not required to give notice to terminate employment. However, a worker who wishes to resign should advise the employer in advance to allow the employer to find a replacement.

9.14.4 A worker **who is absent for more than three consecutive days** without informing the employer of an intention to return to work will have terminated the contract. However, the worker may be re-engaged if a position becomes available.

9.14.5 A worker who does not attend required training events, without good reason, will have terminated the contract. However, the worker may be re-engaged if a position becomes available.

Notice procedure is as follows;

- One week if employed for four weeks or less
- Two weeks if employed for more than four weeks but not more than a year
- Four weeks of employed for one (1) year or more

9.15. Certificate of Service

9.15.1 On termination of employment, a worker is entitled to a certificate stating;

(a) the worker's full name;
(b) the name and address of the employer;
(c) the Project on which the worker worked; the work performed by the worker;
(d) any training received by the worker;
(e) the period for which the worker worked on the Project; and
(f) any other information agreed on by the employer and worker.

9.16. DOMICILE

The address to which notices and all legal documents may be delivered or served are as follows:

Employee Details

Name & Surname: _____

ID No: _____

Residential Address: _____

_____

Contact No: _____

Date of Employment: _____

To be supervised by: **Main Contractor:** ☐
or Sub Contractor: ☐

Category of employment: **Skilled:** ☐
Semi-skilled: ☐
Unskilled: ☐

For Skilled & Semi-skilled state the trade: _____

Period of employment: Fixed for until when your services are still required on site

I confirm that I have been inducted and fully understand the condition of my appointment.

Employee Signature: _____ **Witness by SGB/CLO:** _____

Signature by Witness: _____

Employer Details

Name & Surname: _____
Designation: _____
Contact No: _____ **Signature:** _____

EXPANDED PUBLIC WORKS PROGRAMME
Creating opportunities towards human fulfilment

Project name:

Project Employment Data Management and Reporting Requirements – to be included in the tender documents for the Department of Public Works

NB: All information, documents and files stated herein must be available for Auditor

No.	Information / Document	Comments
1	**Monthly Reports**	
1.1	Monthly reports to be submitted in the specified **Employment Data Collection Form** • This is a monthly schedule where monthly attendance, training and other aspects of participants (labourers) is summarised. The Employment Data Collection Form must provide credible data that corresponds with the Payroll Register and Proof of payment.	
1.2	**Payroll Register** • Which is a list of each participant (labourer) who was paid for each month and which would include the amount of the wage paid.	
1.3	**Proof of payment** • Which is a download from the payment system or a bank statement reflecting all participants paid and the amounts paid	
1.4	**Payment Register/Pay sheet signed by workers** • Where proof of payment is not available, a payment register must be submitted. This is a schedule where participants sign as an acknowledgement of receipt of wages for the number of days worked at a stipulated daily rate. .	
1.5	**ID size photos** • Every participant must have an ID size photo taken within the first month of employment and photo to be supplied to the Department.	
2	**Records to be filed and updated monthly on site**	

No.	Information / Document	Comments
2.1	Identity Document (ID) copies • Every new (at the beginning of employment) participant to provide a certified South African ID copy that is not older than 3 months	
2.2	Daily attendance register showing full name and gender (To correspond with Proof of payment and payroll register and monthly report in the Data Collection Form)	
2.3	Employment Contracts indicating date signed by both the employer and the employee and witnesses if applicable	
2.4	Payslips for all payments made to participants indicating the number of days worked	
2.5	Document where beneficiaries completed / provided their bank account details	
2.6	Completed Beneficiary/participants list-simplified form	
2.7	Project coordinates	
2.8	Project progress report	
3	**Training**	
3.1	Training attendance registers for ALL training attended by participants Number of training days and Training should be reported as follows; 1. Number of people trained 2. Number of people that received accredited training 3. Number of people that received non-accredited training 4. Profile of the participants (Women, Disabled, Youth) 5. Percentage of participants who worked on the project after receiving training.	As and when training is provided
4	**UIF**	
4.1	Evidence to confirm that UIF for participants has been paid for the employment duration	
5	**COIDA**	
	Evidence that the participants of the project are included in the Employers monthly provisions for COIDA.	

No.	Information / Document	Comments
	Evidence that the Employer paid the relevant contributions as required by the Compensation Commissioner.	
6	**COMMUNITY LIASON OFFICER (CLO)**	
	UTILISATION OF A COMMUNITY LIAISON OFFICER The Contractor shall allow for and pay any and all costs necessary for the engagement of the services of a Community Liaison Officer (CLO) for the full duration of this contract A CLO will be identified by the local structures (Project Steering Committee) of the ward areas and appointed following fair and transparent interviewing process, to be conducted in the presence of local structures and the contractor representative, in order to assist the Contractor in the procurement of any local labour, etc. required for this project. The Contractor is to liaise with the CLO and afford him any assistance needed in ensuring sound working relations with the local community. Key Responsibilities of the CLO are envisaged to include and not necessary be limited to: 1. Assisting local leadership in conducting skills and resources audit which facilitates sourcing labour from within the ward or targeted areas for employment, as required by contractor 2. Assisting in sourcing labour-only domestic sub-contractors and the procurement of materials from local resources, as required by the contractor. 3. Assisting the contractor by identifying areas of potential conflict and or threats to the project or to stakeholders in the project and recommend appropriate action to the contractor. 4. Assisting contractor and stakeholders in the project in the resolution of any conflict which may arise. 5. Establishing and ensuring that sufficient and open communication channels between the contractor and the work force are maintained. 6. Establish and ensuring that efficient and open communication channels between the contractor and the community are maintained 7. Identifying and reporting to the Contractor regarding issues where communication between stakeholder is necessary, recommend courses of action and facilitate such communications	

No.	Information / Document	Comments
	8. Assisting the Contractor and the work force in the establishment of grievance procedures and necessary recommendation to the Contractor regarding the grievances and solution thereto. 9. Attending to site meetings and project implementation meetings as required by the Contractor and prepare and submit periodic reports as may be required by the Contractor from time to time. 10. Attending to such other duties which are consistent with the functions of a CLO, as may be required by the Contractor from time to time. Tenderers are to price twice the rate of unskilled local labour rate for the Community Liaison Officer (CLO) against this item for any and all costs arising out of compliance with the foregoing and in the event of a Tenderer failing to price against this item or making inadequate financial provision against this item for compliance as aforesaid, then no claim for costs or additional cost incurred will be entertained by the Head: Public Works F:..... V:..... T:.....	

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 14

ATTENDANCE REGISTER - INFRASTRUCTURE & OTHER PROJECTS

KWAZULU-NATAL DEPARTMENT OF PUBLIC WORKS

EXPANDED PUBLIC WORKS PROGRAMME

The Attendance Register for on-site Workers

Reporting month: _____ Cell No: _____

Surname: _____ First Name: _____

Project Name: **DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK**

Project Code: **075988** Tender No **ZNTM01140W**

IDENTITY NUMBER:

Day	Date	Time In	Signature	Time Out	Signature	Report On Any Formal Training Provided In The Reporting Month
WEEK 1						
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
WEEK 2						
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
WEEK 3						
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
WEEK 4						
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
WEEK 5						
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
Total Days worked						

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 15

EPWP DATA COLLECTION TOOL

BUSINESS PLAN

Reference No	
Profile ID	
Project Name	
Project Details	
Project Name	
Project Reference Number	
Project description	
Project Start Date	
Project End Date	
Estimated Budget	
Project Location	
Province	
District/Metro Municipality	
Local Municipality/Metro Region	
Latitude (in decimal format)	
Longitude (in decimal format)	
Public Body Details	
Public body sphere	
Reporting public body that is the project owner (and will report on the project)	
Implementing public body type	
Public body that will implement the project	
IDP reference number allocated to the project	
EPWP Details	
EPWP Sector	
EPWP Program	
EPWP Sub programme	
Budget Amount	
April 2014/March 2015	
April 2015/March 2016	
Total Budget Amount	
Wages	
UIF	

COIDA	
Training	
Administration	
Equipment and materials	
Other	
Describe other	
Outputs and Training	
Output	
Despription	
Target Quantity	
Number of persons to be trained	
Contact person	
Title	
Initials	
First Name	
Surname	
Email	
Tel (Office)	
Fax Number	
Cell Number	
Physical Address 1	
Physical Address 2	
Physical Address 3	
Physical Address 4	
Postal Address 1	
Postal Address 2	
Postal Address 3	
Postal Address 4	

KZN PUBLIC WORKS
Monthly Data collection for LOCAL Labour

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

EXPANDED PUBLIC WORKS PROGRAMME

Name of Contractor: _____ Project Code: **075988** Project location name (area):_____

Name of Project: **DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK**

Reporting month:_____ Project location (Ward No.):_____

Beneficiary Details																	Experience/Literacy				Location Details				Household Details		
No	First Name	Initial	Surname	ID number	D.O.B	Gender F/M	Disability Y/N	Start Date on the current month	End Date on the current month	Total days worked	Job description	Registered on UIF (Y/N)	Registered with COIDA (Y/N)	Are you receiving any Gov grant? (Y/N)	1st Language	Other Language 1	Other Language 2	Education Level (See Codes below)	Highest Level of Education	Address	Ward No.	Cell No.	Nationality	No. of people in Household	No. of Dependants in Household	No. of Children attending school
1																										
2																										
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										

- Education Levels – use the codes (1,2,3) on the excel spreadsheet
  - **(1)** Unknown **(3)** Grade 1-3 (Sub A – Std 1) **(5)** Grade 5-6 (Std 3-4) ABET 2 **(7)** Grade 9 (Std 7) ABET 4 **(9)** Grade 12 (Std 10)
  - **(2)** No Schoo **(4)** Grade 4 (Std 2) ABET 1 **(6)** Grade 7-8 (Std 5-6) ABET 3 **(8)** Grade 10-11 (Std 8-9) **(10)** Post Matric

Contractor sign:_____ **DPW Official/Consultant sign:**_____ **EPWP Official sign:**_____

Designation:_____ Designation:_____ Designation:_____

Date:_____ Date:_____ Date:_____

Contact no:_____ Contact no:_____ Contact no:_____

KZN PUBLIC WORKS

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

EXPANDED PUBLIC WORKS PROGRAMME

Worker payment capture form for LOCAL Labour

Name of Contractor: _____

Project Code: **075988**

Name of Project: **DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK**

Reporting month: _____

Payment Upload

No.	First Name	Initials	Surname	Identity No.	D.O.B	Job Description	Daily Wage Rate	Total Paid Days	Total Amount Paid	Total days Worked Days
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Contractor sign:_____
Designation:_____
Date:_____
Contact no:_____

DPW Official/Consultant sign:_____
Designation:_____
Date:_____
Contact no:_____

EPWP Official sign:_____
Designation:_____
Date:_____
Contact no:_____

KZN PUBLIC WORKS
Worker Training capture form for LOCAL Labour

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

EXPANDED PUBLIC WORKS PROGRAMME

Name of Contractor: _____ Project Code: 075988

Name of Project:

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

Reporting month: _____

Training														
No	Name	Surname	ID No.	Job description	Course Name	Was training Accredited or Non - accredited by a relevant SETA	Start date on current month	End date on current month	Training Days Paid	Training Days Not Paid	Total Number of Training Days	Cost per trainee	Is training complete or on - going	Name of Training Provider
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														

Contractor sign: _____

Designation: _____

Date: _____

Contact no: _____

DPW Official/Consultant sign: _____

Designation: _____

Date: _____

Contact no: _____

EPWP Official sign: _____

Designation: _____

Date: _____

Contact no: _____

Location	
Locality Name	
Municipality	
Subplace	
Ward	
Government Facility	
Latitude	
Longitude	
Physical Address/Location	

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 16

FIRE SERVICES TECHNICAL SPECIFICATION

PART C3

SCOPE OF WORK

PART C 3.2

STANDARD SPECIFICATIONS: AUTOMATIC SPRINKLER INSTALLATION, FIRE HYDRANTS AND HOSE REELS

1 OBJECTIVE

This specification covers the general technical specifications and components for **automatic sprinkler installations and (passive fire water system) Fire hydrant, hose reels,** as well as installation requirements.

Unless explicitly stated in Part V of the specifications, Automatic Sprinkler Installation systems shall be of the "wet pipe" type.

1.1 GENERAL

1.1.1 A typical automatic sprinkler system shall comprise the following:

- Water storage tanks
- Booster pump set and jockey pump
- Control valves
- Piping and
- Sprinkler heads
- Ancillary valves, fittings etc.

1.2.2 A typical passive fire water system will include:

- Water storage tanks (in the case where municipal water cannot be guaranteed)
- Booster pump and jockey pump (in the case where municipal water cannot be guaranteed)
- Booster connection for the fire department with pressure gauge
- Main suction hydrant
- Water pipe reticulation to internal hydrants and hose reels
- Hydrant and hose reels
- Ancilliary valves, fittings etc.

For the installation and supply of sprinkler systems, hydrants and hose reels, generally Factory Mutual and Loss Prevention Council are deemed to be acceptable approving authorities.

2 PIPING

2.1 MATERIAL

The following shall be deemed to be acceptable:

- Malleable cast-iron pipe fittings that comply with the requirements of SABS 509;
- steel pipes and pipe fittings with a nominal bore up to 150mm that are suitable for screwing to SABS 1109-1 pipe threads, and that comply with the requirements of SABS 62-2;
- galvanized steel tubes, tubulars and fittings that have been galvanized in accordance with the requirements of SABS 763; and
- galvanized iron pipes and fittings that comply with the requirements of SABS 62-1 for medium sized pipes.
- HDPE piping, complying with the requirements of SANS 4427-2, for installation of below ground reticulation

Where buried galvanized steel tubes and fittings can suffer rapid corrosion in acidic soils, special precautions shall be taken to protect such pipes and fittings against external corrosion.

All pipe fittings must be listed by a nationally recognized testing agency, and in full compliance to the appropriate standard. No Eastern Block fittings shall be allowed.

Only Tupy or Crane fittings are allowed. The tender is given timeously and thus if import of fittings are required, there shall be no excuse for late delivery

2.2 WELDED PIPES

Sections of shop-welded piping shall be joined on site by approved fittings. All welding (off site) is to be SANS 10044.

No welding will be allowed to take place on site. Welding shall be subject to X ray testing, at the expense of the contractor.

One out of every 10 welds shall be examined by X ray. Should any weld prove unsatisfactorily, the total installation shall be X rayed.

Only coded welders shall be allowed to weld sprinkler pipe work, and welders certification shall be submitted prior to commencing the installation.

When welding sprinkler piping special attention shall be given to the following:

- Holes in pipe for outlets shall be cut to the full inner diameter of the fitting prior to welding the fitting in place.
- Cut-out pieces shall be retrieved and stored for verification.
- There shall be no penetrations that will reduce the inner diameter of the pipe.
- Torch cutting and welding shall not be permitted as a means of modifying and repairing fire suppression system piping.
- Qualification of the welding procedure to be used and the performance of the welders shall meet or exceed the requirements of the welding standards required by the appropriate NFPA Standards.
- A welding procedure shall be prepared and qualified by the contractor or fabricator before any welding is done. Qualifications of the welding procedure to be used and the performance of all welders and welding operators is required and shall meet or exceed the requirements of American Welding Society Standards AWS DIO.9, Level AR-3.
- Contractors or fabricators shall be responsible for all welding they produce. Each contractor or fabricator shall have an established written quality assurance procedure ensuring compliance with the required standards.

2.3 JOINTS

- All proprietary joints shall be made in accordance with the manufacturer's instructions.
- such joints shall be made watertight and shall remain so during use,
- all pipes, fittings and components to be jointed shall be internally clean,
- care shall be taken to ensure that no jointing material projects inside the bore of the pipe.
- all burrs shall be removed from the ends of pipes, and
- care shall be taken to prevent jointing material from entering the waterways.

Since some flexibility is desirable where there is a possibility of movement in the pipeline or between pipes and fittings, provision shall, where necessary, be made in the assembly of the pipework to accommodate and control thermal movement.

Pipes shall be so joined to one another as to maintain the continuity of the bore.

Jointing materials shall comply with the following:

- Bronze welding filter rods shall contain at least 57% copper;
- silver brazing alloys shall contain at least 1.8% silver;
- lead used for jointing shall be commercially pure;
- soft solder shall be nominally one part lead to one part tin; and
- rubber rings used for jointing shall be of the dimensions, composition and hardness suitable for the particular application.

Threaded joints shall be formed on metal threads by the use of polytetrafluoroethylene (PTFE) tape, hemp, or piping jointing compound, and on uPVC threads by the use of PTFE tape only.

2.4 ABOVE GROUND PIPING.

2.4.1 General

All above ground sprinkler pipe work installed inside buildings up to and including 150mm diameter shall be of Medium Grade Black Piping to SABS 62. Where above-ground pipe work exceeds 150 mm diameter, this shall be of Medium Quality Black Piping to SABS 719 having a wall thickness of at least 6mm.

All fire hose reel and Hydrant piping shall be Medium Grade Galvanized Mild Steel Piping to SABS 62. Pipes 150 mm and above shall be flanged.

2.4.2 Installation (spacing of supports).

All pipes are to be carefully examined for defects and flaws before installation and to be neatly fitted. They shall be run in such manner as to prevent the formation of air locks.

Provision for expansion shall be made in pipe runs by allowing freedom of movement at bends or branches. Reference shall be made to the pipe manufacturer's recommendations and such provision for expansion shall include:

- a clear space to permit movement, and
- sufficient free length of tubing around the being or along the branch, to prevent overstressing of the tube.

When pipes are installed in open spaces are not otherwise held in place, they shall be securely fixed with pipe supports to any structural member of a building with which they come into contact.

Pipe supports shall be of a type and material appropriate to the pipe shall be capable of withstanding the applied loads and shall be corrosion resistant when pipes are installed in locations exposed to corrosive conditions.

Copper holder bats shall not be used for the fixing of steel piping.

Holder bats shall be either built into, or bolted to, the structure of a building. Brackets and clips shall be securely fixed in one of the following ways;

- by drilling and bolting through
- by drilling and caulking with lead (wooden plugs are not permitted);
- by securing with a screwed or bolted masonry anchor;
- by percussive fasteners used in accordance with the manufacturer's instructions; or
- by other approved means

the spacing is acceptable if, under normal operation conditions, the permissible maximum stress for the material from which a pipe is manufactured is not exceeded, and the maximum deflection of the pipe from a straight line between neighbouring supports does not exceed 1/150 of the distance between the supports; or in the case where this stipulation is exceeded the spacing between pipe supports shall be in accordance with the values in SANS 10287 for pipe supports, bracings and anchors.

2.4.3 Hangers

Hangers used in the fire suppression systems shall be listed for the purpose. Pipe shall be substantially supported from the building structure, which must be capable of supporting the weight of the system when filled with water plus a minimum of 114 kg applied at each point of hanging.

Fire suppression system piping shall be supported from the building structure only. Pipe supports for fire suppression system piping shall never be used for non-fire suppression system components. At least one hanger shall be provided for each piece of pipe between two branches or sprinklers.

Spacing between hangers is limited to 3.7m for pipe diameters up to and including 32mm and 4.67m for larger diameters.

The length of an unsupported pipe between an end sprinkler and the last hanger shall not be in excess of 900mm for 25mm, 1.2m for 32mm and 1.5m for larger diameters. When these limits are exceeded the piping shall be extended beyond the last sprinkler and be supported by an additional hanger.

Hanger rod size shall be the same as that approved for use with the hanger assembly and the size of the rods shall not be less than the following.

Hanger rod sizes and strengths shall be in accordance with the minimum requirements as stipulated in the SANAS 10287.

2.4.4 Risers

Risers shall be supported by pipe clamps or by hangers located on the horizontal connections, close to the riser.

For multi storey buildings riser supports shall be provided at the lowest level and at each alternate level above and below offsets and at the top of the riser. There shall be at least one support for each section of the riser. When flexible couplings are used supports at the lowest level shall be designed to prevent upward thrust.

2.5 UNDERGROUND PIPING.

All piping below ground level smaller than 150 mm is to be of heavy grade back piping to SABS 62 (black steel for sprinklers, and galvanized for firewater) suitably protected against corrosion with two layers of fully overlapping Denso wrap or equally approved, or Class 16 uPVC may be used for pipes always under pressure as per SABS 966 Code of Practice.

Pipes in excess of 150 mm diameter shall be heavy grade quality black piping (6 mm minimum wall thickness) to SABS 719(Black steel for sprinklers and galvanized for fire water) with two layers of fully overlapping Denso wrap or equally approved or uPVC piping to SABS 966 as above.

Appropriate steps shall be taken to protect any underground pipes against the transmission of excessive superimposed loads direct to the pipe. Unless otherwise approved, pipes shall have a soil cover of not more than 1m over the outside.

Where a sanitary drain pipe and a pipe that conveys potable water are laid underground horizontally next to each other, they shall be laid at least 500mm apart.

Trench excavations, bedding and backfilling shall be carried out in accordance with SABS 1200-LB
In the case of pipework with flexible or lead caulked joints, adequate measures shall be taken to prevent movement of the pipework due to water pressure effects. Thrust blocks shall be designed and installed in accordance with SABS 1200-L and with the stipulations of SANS 10287,

Where any portion of a pipe passes under a building or under a surface slab, and unless otherwise approved, the following shall apply;

- Such portion shall be installed inside a sleeve of internal diameter at least 15mm plus the outside nominal diameter of such portion;
- such portion shall be protected against the transmission of any load to it;
- such portion shall be laid without any change of direction, and without any junctions; and
- the trench in which such portion is laid shall in no way impair the stability of any building, or interfere with, or affect, any existing services.

Pipes laid in or through floors, concrete slabs or walls.

- Adequate measures shall be taken to protect such portion from external pressure or from the transmission of any load to it:
- should a leak develop in such portion, the installation shall be such that the portion of the pipe can be removed without danger to the building structure; and
- plastic pipes shall not be rigidly encased in floors, concrete slabs or walls.

Where penetrated, compartment walls, floors and fire barriers shall be fire-stopped to prevent the passage of smoke and flame.

2.6 UPVC UNDERGROUND PIPE INSTALLATIONS.

Unless otherwise specified all underground pipework > 50mmø shall be Class 16 uPVC to SABS 966 with rubber ring type joints.

All bends shall be uPVC Class 16 type fittings with rubber ring joints.

All other fittings such as T-pieces, Reducers, Flanges etc. shall be bitumen dipped cast iron rubber ring jointed fittings to SABS 546.

No solvent weld type fittings will be allowed.

All pipes shall be laid on a 100mm sand bedding cradle and covered with 300mm sand before backfilling.

All thrust blocks shall be cast between the pipe and the undisturbed trench material.

No concrete shall come into direct contact with the uPVC pipe.

All pipe crossing under traffic areas shall be backfilled with solicrete and compacted as specified.

All pipework shall be pressure tested with all joints uncovered to the satisfaction of the Engineer.

Suitably sized air release valves built into valve chambers shall be installed at all high points of the pipeline.

3 VALVES AND OTHER FITTINGS

3.1 The installation of the automatic sprinkler installation, as well as the fire hydrants and hose-reels reticulation, shall be installed with the required set of installation control valves, comprising of, but not limited to:

- A main isolating stop valve
- An alarm valve, (wet pipe), and/or an alarm valve, (dry pipe), or a complete alarm valve suitable for either wet or dry systems (sprinkler installation)
- A water motor alarm and gong (sprinkler installation)
- "B" and "C" pressure gauges (sprinkler installation)
- A 15 mm test pipe (sprinkler installation)
- A 50 mm drain pipe (sprinkler installation)
- A 50 mm flushing connection (sprinkler installation)
- A direct reading flow proving test arrangement (sprinkler installation)
- A centrifugal false alarm prevention pump or approved retarding chamber (sprinkler installation)
- Fire brigade booster connections
- In order to ensure that the entire reticulation need not be isolated in the event of maintenance, a block piece shall be fitted between any isolating stop valve positioned upstream or downstream of any alarm valve or device.

3.2 All installation of the valves and gauges to be ins accordance with the stipulations of the SANS 10287 and have appropriate signage to indicate equipment.

4 PRESSURE SENSING DEVICES.

4.1 PRESSURE GAUGES:

Pressure gauges shall be a minimum of 87mm diameter, dial spring type, manufactured in corrosion resistant material, and controlled by bronze gauge valves with a draining arrangement.

The gauge shall be marked in calibrated steps from 0 to 20 bars and be accurate to within 3 %. They shall be listed by a recognized testing agency (ASIB, UL, FM, BSI, LPC, AFNOR, VdS, etc.). Gauges installed indoors shall be glycerine filled to even-out pulsations.

4.2 PRESSURE SWITCHES:

Pressure switches shall be used to provide fire suppression system fault indications for high and, low water pressure, fire pump start initiation on a fall in pressure, and pressure maintenance pump (jockey pump) control, with low pressure initiating a pump start, and high pressure initiating a pump stop. Pressure switches are also used on dry system valves to actuate alarms.

Low pressure switches

High/Low pressure alarm switch: Shall be field adjustable for the low setting to operate between 1.38 to 15.5 bars and the high setting within 3.45 bars, of the low setting. The switch shall unit shall be provided with two single pole double throw (Form C contacts) snap action switches enclosed in an oil resistant NEMA Type 2 drip proof, indoor rated housing. The housing cover shall be finished in red and secured with tamper resistant screws, which require a special key wrench for their removal.

4.3 THE ELECTRICAL SWITCH CONTACTS SHALL BE RATED AS FOLLOWS:

- 125/250v AC 10.00 amps
- 6/12/24v DC 2.50 amps
- 125v DC 0.50 amps
- 250v DC 0.25 amps

The pressure switch unit shall have a 12mm male NPT thread, for connection into the system piping. The pressure switches shall be connected by the Fire Detection and Alarm System Contractor to the central fire alarm panel, to provide a fire suppression system initiated fault condition. Field wiring shall be through a 12mm conduit opening in the base. They shall be listed by a recognized testing agency (UL, FM, BSI, LPC, AFNOR, VdS, etc.).

5 SIGNAGE

The general signage shall also include the block plan of the system (including the fire hydrant and hose-reel layouts) and shall show (as a minimum):

- The class or classes of system to be installed according to the Hazard Class in the various buildings
- Extent of the protection
- The calculated flow and pressure requirement of each installation
- The occupancy of each building
- A cross-section of the full height of the building or buildings indicating the height of the highest sprinkler with respect to a stated datum level

It is the responsibility of the installer to confirm the respective Hazard Class or Classes to which the protection is to be designed.

6 HYDRANTS

Hydrant water connections may not be taken from the downstream side of the sprinkler alarm valve.

All site installed hydrants with underground piping shall be complete with thrust blocks where pipe bends are required. All thrust blocks shall be cast between the pipe and the undisturbed trench material.

Duck-foot bends to be used to all hydrants at foot of fire hydrant. This is to be cast into thrust block.

Any pipe supplying water to a fire hydrants shall be no less than 75mm, except in cases where the pipe lengths exceed 50m, in which case the diameter shall be increased to 100mm.

The water reticulation of the fire water supply shall be in accordance with the stipulations of the SANS 10400 Part W, and shall be so designed to ensure a flow of no less than 1,200l/min at 300kPa to any hydrant.

The fire hydrants shall be of Woodlands manufacture or equivalent, with couplings as specified in SANS 1128 Part 2. No Chubb hydrants shall be allowed in the installation. The body and outlet of the hydrant to be cast of one piece. All hydrants to be fitted with either tamperproof fitting or lockable feature.

Unless otherwise specified, a female instantaneous coupling shall be supplied and installed. The size of the coupling to be no less than 65mm diameter.

7 HOSE REELS

Hose reel connections may not be taken from the downstream side of the sprinkler alarm valve.

The water reticulation of the hose reels shall be designed and installed in such a way to deliver 30l/min at 300kPa at all times.

A hose reel complying with the requirements of SANS 543:2004 and bearing this mark of approval shall be supplied.
The water supply for the hose reels may be connected to the fire hydrant supply reticulation.
Hoses for the fire hose reel shall be 25.4mm diameter, 30 metre length hoses mounted on hose reels, in locations shown on the drawings. The hose shall be two braid red rubber non collapsible hose, coiled onto a steel drum, attached to a sidewall mounting bracket, with supply and hose connections. The hose nozzle shall be a three (3) way nozzle, providing shut off, full jet, and variable spray settings and shall be manufactured from either aluminium or brass.

The hose reel assembly shall be provided with a 25mm isolating valve.

8 FIRE DEPARMTENT BOOSTER CONNECTION

Fire department connections shall be provided at locations indicated on the drawings. The connections shall comprise of an assembly with two (2) siamese arranged, clappered hose valves on a casting with a 100mm flanged outlet. The hose valves shall be provided with hose connections, caps, and chains. The inlet threads or couplings must be compatible with the local fire department equipment.

The booster connection shall be provided with a pressure gauge.

9 SECTION 02: MARKING AND IDENTIFICATION

9.1 EQUIPMENT MARKINGS

All equipment shall bear a name plate with the following minimum information:

- Approval mark of SABS, ASIB or FM
- Manufacturer's name and address
- The nominal capacity or duty
- Date of manufacture and erection
- Installer's name and contact details

SECTION 02: PAINTING AND PROTECTION

1 PIPING

1.1 GENERAL

The sub-contractor shall be responsible for ensuring that the coating manufacturer's instructions, including, but not limited to:

- Surface preparation and cleaning;
- Preparation and application of coating materials; and
- Shelf life and storage requirements are adhered to.

Only approved coating materials as detailed in the specification shall be used. These shall not be mixed with materials from different manufacturers. The sub-contractor shall ensure that piping and proprietary equipment are adequately protected when stored on site to prevent internal corrosion.

1.2 SURFACE PREPARATION.

All sharp edges, burrs, rags and weld splatter shall be removed and weld areas shall be abraded and/or ground. The surface shall be degreased and rinsed with solutions supplied by the coating manufacturer prior to mechanical cleaning (Section 4.4 of SABS 064 Code of Practice). Surface preparation shall be in accordance with ISO 8501-1 and SABS 064 and shall be conducted before erection of pipes.

1.2.1 Priming of new pipework.

All concealed and exposed piping shall have a red oxide prime coat which is factory applied. All damaged areas are to be wire-brushed and re-primed where necessary. No un-primed pipes will be allowed on site. All pipework shall be primed in the workshop before being sent to site.

Should the applicator or manufacturer wish to propose alternative products or coating materials, he shall submit a detailed motivation to the Engineer.

1.2.2 Use of denso type.

Where Denso protection is required, the following specifications must be adhered to:

- Piping to be prepared using Denso Primer, Denso HT Inner Wrap and Denso PVC Outer Wrap;
- Fittings and pipe work other than cast iron must be hot dip galvanised prior to wrapping;
- Denso HT shall be applied by hand and wrapped in a clockwise direction with a minimum 55% overlap; Two layers shall be applied.
- Denso PVC Outer Wrap must be wrapped in an anti-clockwise direction with a minimum 25% overlap, over the second denso layer;
- Buried flanges are to be encapsulated in Denso Mastic prior to the application of the Denso HT tape; and
- The wrapping of pipework must extend at least 150mm above finished ground level and be secured with bandit strapping. In such cases, the PVC tape must be painted with an appropriately compatible ultraviolet resistant paint.

1.3 FINISHING OFF OF COATING OF PIPEWORK.

All exposed pipework is to be coated with two coats of high quality gloss enamel red coloured paint, or in accordance with the colour approved by the Architect. Piping in ceiling voids shall be primed only. It is preferred that all exposed piping be painted in the workshop and only touched up on site

The sub-contractor shall submit a quality plan to ensure that the application work is carried out in strict accordance with the most recent Product Data Sheet from the coating manufacturer. The product data sheet shall be deemed to be part of this specification.

Coatings shall not be applied when surface may become damaged due to rain, dust, condensation, surface temp or excessive humidity (>85%).

All surfaces shall be coated as specified. Successive coats shall be of distinctly different colour to the previous coat to ensure correct inter-coat coverage.

Concealed surfaces shall be completely coated. All edges, corners, bolt holes and cut ends shall be stripe coated by brush application, prior to the application of the second coat.

No coating shall be applied to any surface containing traces of grit, grease, soil, loose rust, surface contaminants (i.e. dust) or loose corrosion product of any kind.

Surface rust on steelwork shall not exceed Grade B of ISO 8501-1.

1.4 FINISHING OFF OF FASTENERS

All nuts and bolts shall be either hot dip galvanised or stainless steel unless otherwise specified. All galvanised nuts and bolts shall be de greased, patch primed and finish coated in accordance with the specification for the respective area of the plant.

1.5 PREVENTION OF GALVANIC CORROSION.

Care must be taken to prevent or mitigate the corrosion caused by dissimilar metal contact on cooling coils, tubes and tube plates, pipes, flanges, frames etc.

Typical metals encountered would be copper, aluminium, zinc, mild steel and stainless steel. The junctions between dissimilar metals must be electrically insulated where possible.

Pipe flanges between dissimilar metals must be insulated using insulating gaskets for the flange faces and insulating sleeves and washers for all nuts and bolts.

Where the insulation of the junction between dissimilar metals is not practical, the cathode surface on the electrolyte or "wet" side must be coated for a minimum distance of 100 mm from the junction. The applied coating must effectively isolate the coated surface from the electrolyte.

1.6 INSPECTION AND TESTING.

All necessary inspections and tests shall be performed by the sub-contractor and witnessed by the design team in accordance with the approved Quality Plan on corrosion protection.

A visual inspection for paint film defects shall be performed after each coat is applied. All defects shall be corrected before the next full coat is applied. Dry film thickness shall be measured in accordance with SABS Method 141 Clause 3.3 (smooth disc). Any reading outside this range is cause for rejection and may require the removal of the entire coating and reapplication thereof. Actual readings and not averages shall be recorded.

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 17

HVAC TECHNICAL SPECIFICATION

PART C3.2

STANDARD SPECIFICATION

The equipment and/or sub-system supplier/assembler shall provide under the overall responsibility and control of the HVAC Subcontractor, all permanently installed instrumentation necessary for logging and monitoring of status and performance of equipment and components.

In addition, a hand held digital electric instrument, measuring temperature and humidity shall be provided at handover for use by the Employer.

All instruments shall be of such dimensions and mounted in position so that they are easily and accurately readable by an operator standing on the floor.

Test instruments shall be checked for accuracy by the manufacturer or by an approved laboratory with certificates being submitted prior to site tests, showing the degree of accuracy.

1 TEMPERATURE INDICATION

1.1 All direct reading thermometers and temperature reading devices shall have an accuracy of 0.5°C and a range of -10°C to 50°C, unless otherwise specified, with graduation being in steps of 1°C.

1.2 Stem thermometers shall be approximately 150 mm long and dial type thermometers minimum 80mm diameter.

1.3 Wells shall be set vertical or at an angle to retain oil. Pipes smaller than 80 mm bore shall be enlarged at points where wells are installed as per following table:

-	Pipe bore (mm)		15	20	25	32	40	50	65
-	Size of enlargement (mm)	32	40	50	50	50	65	80	

1.4 The sensor element shall be at the centre of the pipe.

2 PRESSURE INDICATION

2.1 All dial pressure gauges shall be glycerine filled to prevent pointer vibration. Gauges shall have an accuracy of 2%. The range shall extend to 150% of the maximum operating pressure.

2.2 All inclined manometer differential pressure gauges shall have an accuracy of 2%. The range shall extend to 150% of the maximum operating pressure, with graduation being in steps of 10 Pa.

2.3 All differential dial pressure gauges shall have an accuracy of 2% and shall not be less than l00 mm diameter. Zero pressure reading shall be in the centre, and the range of scale on either side shall extend to 150% of the maximum operating pressure, with provision being made for individual pressure reading.

2.4 Syphon tubing to pressure gauges must be galvanised and must be insulated.

2.5 Pressure gauges must be installed before and after water strainer.

3 HYGROMETERS

3.1 Hygrometers shall have an accuracy of 5% in the range of 20% to 100% relative humidity.

4 FLOW METERS

4.1 Liquid flow shall be measured by means of an in-line orifice, or Venturi tube and differential pressure gauge normally calibrated in litres per second - 5% accuracy.

All identification shall be clearly legible, and shall be painted or fixed after completion of final finishes. Label diagrams, colour coding and font requirements are specified in this document and are in accordance to SANS and ISO10140-3:2017.

1 SIGHTGLASS/MOISTURE INDICATOR

1.1 A sightglass/moisture indicator shall be installed in the refrigerant circuit of each chiller and/or condensing unit.

1.2 The indicator shall be suitable to read the recommended moisture levels of the refrigerant used.

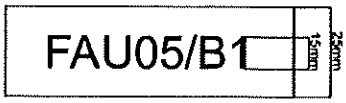
1.3 The indicator must be after the filter drier and must be visible.

2 LABELS

2.1 A label shall be provided to the following equipment and instruments:

- Chillers
- Cooling Towers
- Condensers
- Pumps
- Air Handling Units
- Fans
- Fan Coil Units
- Dampers
- Fire Dampers
- Motor Control Centre (MCC) &
- Instruments (BMS)

2.2 The label shall consist of non-corroding material with a non-glossy appearance. Letters shall be 15mm high, black engraved on a white background. Labels shall be 25mm high and shall either slide into an aluminium bracket/rail or stuck with a durable adhesive to handle heat, vibration and cooling at industrial level as per the example below:



3 VALVE TAGS AND CHARTS

3.1 Numbered tags including letters to identify the system shall be provided. Tags to be of non-corroding material (aluminium or stainless steel).

3.2 The tags shall be 50mm in diameter and 1mm thick. Lettering to be engraved/filled or laser engraved black in colour. Lettering to suit size of tag and label description. Tags shall be attached/fastened by non-corroding method to all valves indicated on the drawings. NO split rings or chains are to be used.

3.3 The Subcontractor shall be responsible for submitting a list of all valves and controls, giving location and function, together with diagrammatic charts featuring each piping system with valves and controls, identified by numbers and letters shown on the corresponding tags.

4 VAV DIFFUSERS

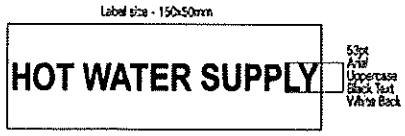
4.1 Each diffuser shall be labelled with a vinyl sticker to indicate a unique number which shall be reflected on the as built drawing, drawing asset register and commissioning sheets.

5 PIPING

5.1 All painting of pipes (including insulation), to be done prior to any identification marking.

5.2 Colour bands and description/identification labels shall be provided to piping at – valve location, at points where piping enters or leaves a partition, wall, floor or ceiling and at least at every 10m centres of straight runs. Where piping is concealed, bands shall be applied at valves or other devices whenever access is provided by doors or panels. Exit and entrance points to each vessel, tank or place of equipment shall be identified by bands. The band's width shall be a minimum of 200mm wide for pipes up to 250mm diameter and 400mm wide for larger diameter piping. The pre-printed letters on bands, identifying the service shall be at least 20mm high.

5.3 Description/Identification label and directional arrow to be black text on a white background. Description/Identification labels to be of a polyvinyl material. External labels to be weather-proof and all to be self-adhesive. Label to be 150x50mm in size.



5.4 Piping of less than 25mm nominal bore need not be colour banded but shall be painted all over with the identifying colour of its content.

5.5 The flexible hoses serving the access floor and/or ceiling fan coil units shall be colour banded as follows:

- Hoses with "male" part of coupler: "midnight blue"
- Hoses with "female" part of coupler: "light blue"

5.6 Only one band with a minimum width of 20mm shall be provided around

5.7 Re-insulation on both ends of the hose.

6 DUCTWORK

6.1 All ductwork shall be installed "as supplied" or insulated with aluminium foil or cladding. No painting required unless otherwise stipulated. No banding to be applied.

6.2 A label shall be applied to identify the content. A separate label to be applied for directional flow (arrow). Labels to be of a polyvinyl material. External labels to be weather proof (laminated) and all to be self-adhesive. Identification label and arrow to match in colour to make identification/recognition of content universal.

6.3 Markings shall appear at least at the point of origin and whenever ducting enters or leaves walls, floors or ceilings and for every 20m centres of straight lines.

6.4 Identification label and directional flow arrow to be 150x50mm in size (same drawings & dimensions as per piping labelling in this document). Labels to be colour coded as per the table supplied in this document. Sizing of labels to be 50mm high and the flow arrow 150mm long.

7 ACCESS PANELS

7.1 Approved tile markers shall be provided in areas where removable ceilings or access panels are positioned to indicate the location of valves and/or other devices.

8 COLOUR CODING

8.1 All colour coding of piping, hoses, ducting and painting to be applied using the table below. All colour reference to RAL which is a universal colour formula. Colours will vary when viewing from different devices (screen resolution), therefore RAL colours are used as a guide/reference. All printers and paint manufacturers will be able to do necessary calculations to match the nearest/closest colour from the RAL breakdown. Unless otherwise indicated, the colour table below shall be used:

No.	DESCRIPTION	PAINT CODE	PAINT COLOUR	FINISH	LABEL DESCRIPTION	DIRECTIONAL ARROW	COLOUR BAND 20mm	LABEL TYPE	RAL COLOUR code	COMMENTS
A	EQUIPMENT									
1	Steel Bases	RAL7001	SILVER GREY (Mixes grey)	PAINTED	N/A	N/A	N/A	N/A	N/A	
2	Chillers	N/A	N/A	AS SUPPLIED	ENGRAVED TRAFOLITE LABEL	N/A	N/A	25mm height	BLACK TEXT / WHITE BACK	As per 2.1 and 2.2 above.
3	Cooling towers	N/A	N/A	AS SUPPLIED	ENGRAVED TRAFOLITE LABEL	N/A	N/A	25mm height	BLACK TEXT / WHITE BACK	As per 2.1 and 2.2 above.
4	Condensers	N/A	N/A	AS SUPPLIED	ENGRAVED TRAFOLITE LABEL	N/A	N/A	25mm height	BLACK TEXT / WHITE BACK	As per 2.1 and 2.2 above.
5	Pumps	N/A	N/A	AS SUPPLIED	ENGRAVED TRAFOLITE LABEL	N/A	N/A	25mm height	BLACK TEXT / WHITE BACK	As per 2.1 and 2.2 above.
6	Motors	N/A	N/A	AS SUPPLIED	N/A	N/A	N/A	N/A	N/A	
7	Belt guards	RAL1004	GOLDEN YELLOW	PAINTED	N/A	N/A	N/A	N/A	N/A	
9	Chiller Frames	N/A	GALVANISED	AS SUPPLIED	N/A	N/A	N/A	N/A	N/A	As supplied or painted
10	Condenser Support Frames	N/A	GALVANISED	AS SUPPLIED	N/A	N/A	N/A	N/A	N/A	As supplied or painted
11	Fans	N/A	N/A	AS SUPPLIED	ENGRAVED TRAFOLITE LABEL	N/A	N/A	25mm height	N/A	Fan to be labeled
12a	Pipe Brackets (Outdoor)	RAL7001	SILVER GREY (Mixes grey)	AS SUPPLIED	N/A	N/A	N/A	N/A	N/A	Outdoor painted
12b	Pipe Brackets (Indoor)	N/A	GALVANISED	AS SUPPLIED	N/A	N/A	N/A	N/A	N/A	Indoor as supplied
13	Shut Off Valve Handles	RAL3020	TRAFFIC RED	PAINTED	N/A	N/A	N/A	N/A	N/A	
14	Plenums	N/A	GALVANISED	AS SUPPLIED	N/A	N/A	N/A	150x50mm	N/A	Should label be required - RAL1015 (LIGHT IVORY)
15	Compressors	N/A	N/A	AS SUPPLIED	N/A	N/A	N/A	N/A	N/A	
B	DUCTING									
16	Kitchen Ventilation Ducts	N/A	GALVANISED	AS SUPPLIED	KITCHEN VENT	BLACK ARROW / WHITE BACK	N/A	150x50mm	BLACK TEXT / WHITE BACK	Should colour band be required - RAL7002 (PEBBLE GREY)
17	Toilet Ventilation Ducts	N/A	GALVANISED	AS SUPPLIED	TOILET VENT	BLACK ARROW / WHITE BACK	N/A	150x50mm	BLACK TEXT / WHITE BACK	Should colour band be required - RAL7002 (PEBBLE GREY)
18	Ventilation Ducts (Fresh Air)	N/A	GALVANISED	AS SUPPLIED	FRESH AIR	BLACK ARROW / WHITE BACK	N/A	150x50mm	BLACK TEXT / WHITE BACK	Should colour band be required - RAL1015 (LIGHT IVORY)
19	Air Conditioning Ducts (Supply Air)	N/A	Galvanised Cladding / Exposed Vapour barrier	SPEC	SUPPLY AIR	BLACK ARROW / WHITE BACK	N/A	150x50mm	BLACK TEXT / WHITE BACK	Should a colour band be required - RAL4012 (PEARL BLACKBERRY)
20	Air Conditioning Ducts (Return Air)	N/A	Galvanised Cladding / Exposed Vapour barrier	SPEC	RETURN AIR	BLACK ARROW / WHITE BACK	N/A	150x50mm	BLACK TEXT / WHITE BACK	Should a colour band be required - RAL7004 (SIGNAL GREY)
C	PIPING									
21	Condenser Water Piping (Supply)	RAL6036	PEARL OPEL GREEN	PAINTED	CW SUPPLY	BLACK ARROW / WHITE BACK	N/A	150x50mm	BLACK TEXT / WHITE BACK	Should a colour band be required - RAL6000 (OPEL GREEN)
22	Condenser Water Piping (Return)	RAL6018	YELLOW GREEN	PAINTED	CW RETURN	BLACK ARROW / WHITE BACK	N/A	150x50mm	BLACK TEXT / WHITE BACK	Should a colour band be required - RAL6018 (YELLOW GREEN)
23	Chilled Water Piping (Supply)	N/A	Galvanised Cladding / Exposed Vapour barrier	SPEC	CHW SUPPLY	BLACK ARROW / WHITE BACK	IMPLUSE BLUE (1186)	150x50mm	BLACK TEXT / WHITE BACK	Colour band - RAL5005 (SIGNAL BLUE)
24	Chilled Water Piping (Return)	N/A	Galvanised Cladding / Exposed Vapour barrier	SPEC	CHW RETURN	BLACK ARROW / WHITE BACK	CORNFLOWER BLUE (1172)	150x50mm	BLACK TEXT / WHITE BACK	Colour band - RAL5012 (LIGHT BLUE)
25	Make - Up Water	N/A	Galvanised Cladding / Exposed Vapour barrier	SPEC	MAKE-UP WATER	BLACK ARROW / WHITE BACK		150x50mm	BLACK TEXT / WHITE BACK	Colour band - (PURPLE)
26	Hot Water Piping (Supply)	N/A	Galvanised cladding / Exposed insulation	SPEC	HW SUPPLY	BLACK ARROW / WHITE BACK	CARDINAL RED (1169)	150x50mm	BLACK TEXT / WHITE BACK	Colour band - RAL3020 (TRAFFIC RED)
27	Hot Water Piping (Return)	N/A	Galvanised cladding / Exposed insulation	SPEC	HW RETURN	BLACK ARROW / WHITE BACK	ORANGE (1163)	150x50mm	BLACK TEXT / WHITE BACK	Colour band - RAL2004 (PURE ORANGE)
28	Steam (Supply)	N/A	N/A	INSULATED	STEAM SUPPLY	BLACK ARROW / WHITE BACK	CARDINAL RED (1169)	150x50mm	TRAFFIC RED RAL3020	Colour band - RAL3020 (TRAFFIC RED)
29	Steam (Return)	N/A	N/A	INSULATED	STEAM RETURN	BLACK ARROW / WHITE BACK	ORANGE (1163)	150x50mm	BLACK TEXT / WHITE BACK	Colour band - RAL2004 (PURE ORANGE)
30	Vacuum Gas	N/A	N/A	INSULATED	N/A	N/A	20mm band	N/A	refer to 5.6 & 5.7	
31	Compressed Air	N/A	N/A	INSULATED	N/A	N/A	20mm band	N/A	refer to 5.6 & 5.7	

1 GENERAL REQUIREMENTS

1.1 The requirements of ISO 12944 shall apply as a minimum to all coating application activities. Supplementary requirements are given in this document. In the event of conflict between this document and the ISO standard, the requirements of this document will prevail.

1.2 The sub-contractor shall be responsible for ensuring that the coating manufacturer's instructions, including, but not limited to:

1.2.1 Surface preparation and cleaning.
1.2.2 Preparation and application of coating materials.
1.2.3 Shelf life and storage requirements

are adhered to:

1.3 Only approved coating materials as detailed in the specification shall be used. These shall not be mixed with materials from different manufacturers.

1.4 The sub-contractor shall use experienced labour with qualified supervision and inspection. Applicators and supervisors should preferably be qualified to the South African Qualification and Certification Committee for Corrosion Protection (SAQCC) PA1 and SP1.

1.5 The sub-contractor shall use colours selected by the design team to the SANS 1091 or RAL colour standards.

1.6 The sub-contractor shall ensure that piping and proprietary equipment are adequately protected when stored on site to prevent internal corrosion.

2 GREEN STAR REQUIREMENTS

2.1 Any paint/solvent based coating used for piping, support steelwork and air-conditioning ductwork and equipment must have a VOC content of less than 200 g/l in the 'ready-to-use' product. Where the manufacturer requires solvent additions to the as-supplied product strict instructions are required from the manufacturer in terms of the maximum solvent additions allowed to ensure that the ready-to-use product still meets the 200 g/l limit.

3 SURFACE PREPARATION

3.1 All sharp edges, burrs, rags and weld splatter shall be removed and weld areas shall be abraded and/or ground.

3.2 The surface shall be de-greased and rinsed with solutions supplied by the coating manufacturer prior to mechanical cleaning (clause 4.4 of SANS 10064).

3.3 Surface preparation shall be as specified in accordance with ISO 8501-1 and SANS 10064 and shall be conducted before erection of pipes

4 COATING/PROTECTION SPECIFICATIONS

APPLICATION	SPECIFICATIONS/CODES
Protective Coatings	(Refer to Appendix A)
The external protection of insulated chilled water piping.	PCS 01
The external protection of uninsulated steel piping internal and external to buildings in both inland and marine environments and mild steel support structures and black steel kitchen extract ducting internal to buildings in inland and dry environments.	PCS 02
Mild steel support structures to buildings in moist conditions and external to buildings in inland environments.	PCS 03
Mild steel support structures internal and external to buildings in marine environments.	PCS 04

APPLICATION	SPECIFICATIONS/CODES
Anti-Corrosive Coatings	
Air Cooled condenser coils within 35km of the coast or coils where specifically specified	- Salt spray as per ASTM B117 of >5000hrs (corrosion durability) - Cross hatch as per ASTM 3359-93 of 5B (adhesion) - UV resistance as per ASTM D4587 of 500 hours - Heat transfer loss must be less than 1%. - The coating dry film thickness should be 15-30 micons without material bridging between fins. - The coating applicator must provide a declaration ROHS (Restriction of Hazardous Substances).

APPLICATION	SPECIFICATIONS/CODES
The external surfaces of galvanised steel ducting internal and external to buildings in both inland and marine environments.	PCS 05
Electric motors, gearboxes, pumps, valves and other proprietary equipment internal or external to buildings in both inland and marine environments.	PCS 06
Hot Dip Galvanizing	
Due cognisance of the type of article and zinc thickness is required.	SANS 121 (ISO 1461) – Hot dip galvanized coatings on fabricated iron and steel articles – specifications and test methods
Powder Coatings	
Steel or galvanised components.	SANS 1274 – Type 6
Architectural aluminium components.	SANS 1578-1 SANS 1578-2
ANODIZING OF ALUMINIUM	
Architectural components	SANS 999
General purpose aluminium articles	SANS 1407

4.1 Should the applicator or manufacturer wish to propose alternative products or coating materials, he shall submit a detailed motivation to the Engineer. The motivation shall include, but not be limited to the following:

4.1.1 Benefit to the Client
4.1.2 Product licensor and technical back-up available;
4.1.3 Location, experience and ISO quality rating of the production facility;
4.1.4 Detailed case histories;
4.1.5 Performance guarantee offered;
4.1.6 Manufacturer's data sheets for each product.
4.1.7 Confirmation that the coatings meet the specified VOC requirements.

5 COATING APPLICATION

5.1 The sub-contractor shall submit a Quality Plan for approval prior to the commencement of any coating work.

5.2 The coating application work shall be carried out in strict accordance with the most recent Product Data Sheet from the coating manufacturer.

5.3 The product data sheet shall be deemed to be part of this specification.

5.4 Coatings shall not be applied when surface may become damaged due to rain, dust, condensation, surface temp (>30°C) or excessive humidity (>85%).

5.5 All surfaces shall be coated as specified. Successive coats shall be of distinctly different colour to the previous coat to ensure correct inter coat coverage. Special attention shall be given to cracks, crevices and edges to ensure complete coverage and paint thickness.

5.6 The primer shall be applied as soon as possible after the surface preparation operation, but within 4 hours.

5.7 Concealed surfaces shall be completely coated.

5.8 All edges, corners, welded joints, flanges, bolt holes and cut ends shall be stripe coated by brush application, prior to the application of the second coat.

5.9 No coating shall be applied to any surface containing traces of grit, grease, soil, loose rust, surface contaminants (i.e. dust) or loose corrosion product of any kind.

5.10 Surface rust on steelwork shall not exceed Grade B of ISO 8501-1.

5.11 Coating that was applied excessively which shows marks of wet running paint or poor workmanship must be sanded down and re-painted.

6 PATCH REPAIR PROCEDURE

6.1 Following transport and erection, all areas of coating damage shall be patch repaired by brush application to reinstate the original specified system.

6.2 The extent of the damage shall be carefully inspected to assess which coats in the system have been damaged.

6.3 When the damage extends to the steel substrate, all coats in the system shall be re-instated. Areas to be primed shall be cleaned of dust, dirt, grease or other deleterious matter and mechanically cleaned to grade St 3 of ISO 8501/1.

6.4 All edges of existing coatings shall be feathered back to a hard edge. The patch primer used shall be in accordance with the requirements of the relevant coating system.

7 FASTENERS

7.1 All nuts and bolts shall be either hot dip galvanised or stainless steel unless otherwise specified.

7.2 All galvanised nuts and bolts shall be de greased, patch primed and finish coated in accordance with the specification for the respective area of the plant.

7.3 Washers shall be fitted to each nut and bolt.

7.4 A minimum of two full threads of the bolt must be visible behind the nut once tightened.

7.5 Bolt protrusion behind nut shall not exceed 25mm once tightened.

7.6 Threaded hanger rod ends shall not protrude more than 25mm below the bottom of the support bracket. .

7.7 Support brackets shall be coated to PCS 02. Any damage to the bracket coatings during installation shall be repaired in accordance with the PATCH REPAIR PROCEDURE.

7.8 If the galvanized threaded hanger rods are damaged or cut during installation the damaged zinc coating shall repaired in accordance with SANS 121 (ISO 1461) by means of epoxy zinc rich paint. The zinc rich paint shall contain a minimum of 80% zinc in the dry film and the thickness shall be 30 micron greater than the specified galvanizing zinc thickness. The damaged area shall be thoroughly cleaned and the repair coating shall overlap onto the surrounding sound zinc for a distance of at least 25 mm.

7.9 The zinc rich paint for repairs shall be as recommended by the HDGASA, i.e. either Zincfix (Speccoats) or Galvpatch (Drivelines and Sprayflow cc).

7.10 The use of aerosol spray repair coatings is not permitted.

8 THE PREVENTION OF GALVANIC CORROSION

8.1 Care must be taken to prevent or mitigate the corrosion caused by dissimilar metal contact on cooling coils, tubes and tube plates, pipes, flanges, frames etc. Typical metals encountered would be copper, aluminium, zinc, mild steel and stainless steel.

8.2 The junctions between dissimilar metals must be electrically insulated where possible.

8.3 Pipe flanges between dissimilar metals must be insulated using insulating gaskets for the flange faces and insulating sleeves and washers for all nuts and bolts.

8.4 Where the insulation of the junction between dissimilar metals is not practical, the cathode surface on the electrolyte or 'wet' side must be coated for a minimum distance of 100 mm from the junction. The applied coating must effectively isolate the coated surface from the electrolyte.

9 INSPECTIONS AND TESTING

9.1 The sub-contractor shall have the necessary equipment and qualified staff to carry out the quality control required to ensure compliance with the specification. The coating inspector shall preferably be qualified to either the South African Qualification and Certification Committee for Corrosion Protection (SAQCC) Level 1 or NACE CIP Level 1.

9.2 The following inspections and tests shall be performed by the sub-contractor and witnessed by the design team in accordance with the approved Quality Plan on corrosion protection.

9.3 Visual inspection for paint film defects shall be performed after each coat is applied. All defects including pinholes, sags and runs shall be corrected before the next full coat is applied.

9.4 Painted surface must be continuous, smooth and uniform

10 DRY FILM THICKNESS

10.1 Dry film thickness shall be measured in accordance with ISO 2808:1967. Instrument calibration shall be on the smooth calibration disc provided by the instrument manufacturer.

10.2 The required dry film thickness is given in recommended 'windows' for each coat in the relevant coating specification, i.e. required minimum and acceptable maximum. As the various brand coatings are being guaranteed by the respective coating manufacturers, the minimum and maximum thickness requirements must be as specified in the relevant manufacturer's Product Data Sheet. Any reading outside the manufacturer's specified range is cause for rejection and may require the removal of the entire coating and reapplication thereof.

10.3 Actual readings and not averages shall be recorded.

11 QUALITY ASSURANCE

11.1 SUB-CONTRACTOR QUALIFICATION

11.1.1 The design team may, at its discretion, require a Quality Audit of the painting sub-contractor to ensure that he has the management, facilities, skilled staff and quality control facilities and staff, to carry out both the coating application and the required quality control during application of coatings to ensure compliance with specification.

11.1.2 The sub-contractor shall accept full responsibility for the quality of his work and of materials used, irrespective of any quality surveillance that may be carried out by the design team.

11.1.3 The sub-contractor shall keep at least the following records in his QA File on site:

- Product Data Sheets
- Material batch records
- Psychrometric records
- Records of surface preparation
- Dry film thickness measurements per coat
- Copies of inspection reports issued by the coating manufacturer
- Copies of inspection reports issued by the design team

12 DATA BOOK

12.1 Upon completion of the works, the sub-contractor shall provide the Engineer with a Data Book containing all the relevant Quality Control documents and records pertaining to the works.

12.2 This data book shall contain, as a minimum, the following:

- The relevant PCS specifications
- The Quality Plan
- Copies of all Batch Release Certificates from the paint manufacturer
- All relevant QC Records listed above
- Copies of all design team reports
- Copies of all Release Certificates

12.3 The sub-contractor shall keep a copy of the Data Book for his own records.

13 GUARANTEES

13.1 The Engineers requires performance guarantees for the applied coating systems. Such guarantees shall be provided jointly by the coating manufacturer and coating applicator. The minimum guarantee period will be 8 years and the criteria for failure will not exceed Ri 3 of ISO 4628-3.

13.2 Although visible coating defects such as blistering, cracking, flaking and peeling are not always associated with visible rusting, they indicate defects that could either lead to substrate corrosion or are shielding substrate corrosion that has already taken place beneath the coating. Any such defects noted during the guarantee period shall be repaired.

13.3 This joint guarantee must be submitted at the time of tender.

13.4 All guarantees in the terms of protection against corrosion shall be ceded to the client.

APPENDIX A
PROTECTIVE COATING SPECIFICATIONS

SPECIFICATION NO: PCS 01

Description: The external protection of insulated chilled water piping.

	Surface Preparation	Primer Coat	Intermediate Coat	Finishing System
Supplier	Degrease Wire brush St 3	Al filled surface tolerant epoxy primer 50 – 125 microns	High build micaceous iron oxide epoxy 75 – 150 microns	Insulation + vapour barrier
International	Degrease Wire brush St 3	Interseal 670HS Aluminium	Intergard 475HS MIO	-
VOC g/l	-	182	193	
Jotun	Degrease Wire brush St 3	Jotamastic 80 Al Std comp B	Penguard Midcoat MIO Red,Grey	-
VOC g/l	-	145	180	
Plascon	Degrease Wire brush St 3	Plascon Plascotuff 3000 (PEX3004/PEH 3)	Plascon Plascotuff 3000 (PEX3004/PEH 3)	-
VOC g/l	-	150	150	
Stoncor	Degrease Wire brush St 3	Carbomastic 15	Carboguard 893	-
VOC g/l	-	88	195	-

SPECIFICATION NO: PCS 02

Description: The external protection of un-insulated steel piping internal and external to buildings in both inland and marine environments and mild steel support structure internal to buildings in inland and dry environments.

	Surface Preparation	Primer Coat	Intermediate Coat	Finishing Coat
Supplier	Degrease Wire brush St 3	Al filled surface tolerant epoxy primer 50 – 125 microns	High build micaceous iron oxide epoxy 75 - 150 microns	Water borne acrylic latex 50 – 75 microns
International	Degrease Wire brush St 3	Interseal 670HS Aluminium	Intergard 475HS MIO	Intercryl 700
VOC g/l	-	182	193	15
Jotun	Degrease Wire brush St 3	Jotamastic 80 Al Std comp B	Penguard Midcoat MIO Red,Grey	Waterfine Topcoat Standard shades
VOC g/l	-	145	180	70
Plascon	Degrease Wire brush St 3	Plascon Plascotuff 3000 (PEX3004/PEH 3)	Plascon Plascotuff 3000 (PEX3004/PEH 3)	Plascon Metalcare WB Enamel (WBE)
VOC g/l	-	150	150	60
Stoncor	Degrease Wire brush St 3	Carbomastic 15	Carboguard 893 MIO	Carbocrylic 3350
VOC g/l	-	88	195	24

SPECIFICATION NO: PCS 03	
Description:	Mild steel support structures internal to buildings in moist condition and external to buildings in inland environments.
	Hot-dip galvanise to SANS 121 (ISO 1461)

SPECIFICATION NO: PCS 04/PCS 05

Description PCS 04: Mild steel support structures internal and external to buildings in marine environments.
Galvanise (un-passivated) + duplex coating

Description PCS 05: The external surfaces of galvanised steel ducting internal and external to buildings in both inland and marine environments.

	Surface Preparation	Primer Coat	Finishing Coat
Supplier	Galvanised Iron Precleaner	Epoxy Galvanising primer 50 – 80 microns	Water borne acrylic latex 50 – 75 microns
International	Galvanised Iron Precleaner	Interseal 670HS Aluminium	Intercryl 700
VOC g/l	-	182	15
Jotun	Galvanised Iron Precleaner	Jotamastic 80 Al Std comp B	Waterfine Topcoat Standard shades
VOC g/l	-	145	70
Plascon	Galvanised Iron Precleaner GIC	Plascon Plascotuff 3000 (PEX3004/PEH 3)	Plascon Metalcare WB Enamel (WBE)
VOC g/l	-	150	60
Stoncor	Galvanised Iron Precleaner	Carboclad 900	Carbocrylic 3350
VOC g/l	-	22	24

SPECIFICATION NO: PCS 06

Description: Electric motors, gearboxes, pumps, valves and other proprietary equipment internal and external to buildings in both inland and marine environments. Over manufacturer's standard finish.

Note: Conduct an adhesion test on the proprietary coating in accordance with SANS 5159. If the adhesion coefficient is less than 8, return item to manufacturer for replacement. If the adhesion coefficient is 8 or 10, apply upgrade system as above.

	Surface Preparation	Primer Coat	Finishing Coat
Supplier	St3 Degrease	Epoxy maintenance primer 50 - 125 microns	Water borne acrylic latex 50 – 75 microns
International	St3 Degrease	Interseal 670HS Aluminium	Intercryl 700
VOC g/l	-	182	15
Jotun	St3 Degrease	Jotamastic 80 Al Std comp B	Waterfine Topcoat Standard shades
VOC g/l	-	145	70
Plascon	St3 Degrease	Plascon Plascotuff 3000 (PEX3004/PEH 3)	Plascon Metalcare WB Enamel (WBE)
VOC g/l	-	150	60
Stoncor	St3 Degrease	Carbomastic 15	Carbocrylic 3350
VOC g/l	-	88	24

1 GENERAL

1.1 This is a performance specification that requires an equipment submission.

1.2 In case of conflict, this specification takes preference over material and application codes. If the conflict is fire related, the relevant fire code takes preference over this specification.

2 CODES

2.2 Insulation shall be applied as specified in SANS Standards 1238 –2005 and 0173-2003.

3 FIRE

3.1 All thermal and acoustic insulation materials, adhesives, straps and finishes used shall, when tested in accordance with SANS Standard 1238-2005 and BS standard 476, comply with the stated indexes for surface spread of flame, heat contribution, smoke contribution and fire index.

3.2 Material shall be free from substances, which in the event of a fire would generate appreciable quantities of smoke, noxious or toxic fumes.

3.3 Flexible ducting complete with insulation shall be constructed of non-combustible material as required in terms of the building regulations provided that:

3.3.1 Approved combustible flexible connections may be used where the length of such connection does not exceed 1.5m and such connection does not pass through any wall or floor which is required to have a specified fire resistance.

3.3.2 Approved combustible flexible joints not more than 250mm in length may be used in any plant room where such plant room is protected by a smoke detection system.

4 ENVIRONMENTAL

4.1 Insulation materials and finishes shall prevent rotting, mould, fungal growth and attack by vermin, be non-hygroscopic and in all respects to be suitable for continuous use throughout the range of operating temperatures and within the environment indicated.

4.2 Insulation material and their finishes shall be free from any form of asbestos.

4.3 No exposed glass fibre shall be permitted in contact with air.

4.4 The insulation material shall not contain CFC's and shall be ozone and ultraviolet resistant with an ODP value of ZERO

4.5 The thermal resistance of the material shall not degenerate below the thermal resistance value quoted over the life span of the product.

4.6 All thermal insulation for pipes and ducts shall have no ozone-depleting substances associated with either the manufacture or composition of the product. Fibre-based woven insulation products (e.g. glass fibre, mineral wool, polyester etc.) and foil insulation are not manufactured using blowing agents may be used.

4.7 The Contractor is to provide written confirmation that all insulation materials installed are as per specification. Contractor is also to provide manufacturer's data sheets for each insulation product,

5 QUALITY ASSURANCE

5.1 GENERAL

5.1.1 Prior to insulation being fitted, all pressure testing shall be satisfactorily completed. The Specialist Insulation Contractor is, however, allowed to start insulating ductwork before testing provided that all joints are uncovered and visible for inspection.

5.1.2 The HVAC Sub-contractor shall arrange inspections by the Consulting Engineer for the following events:

5.2 PIPING

5.2.1 Samples (For piping, supports, fittings etc. as agreed with the Consulting Engineer)

5.2.2 After paint application to surfaces to be insulated

5.2.3 After second vapour barrier application

5.2.4 Completion of cladding

5.3 DUCTING

5.3.1 Samples (As agreed with the Consulting Engineer)

5.3.2 Finished product

5.4 INSULATION

Insulation shall be stored in a dry and protected environment, and shall be protected after installation. Any materials with signs of physical or moisture damage will be rejected.

6 EQUIPMENT SUBMISSIONS/SAMPLES

6.1 Sample sections of final insulation will be required prior to commencement, as part of the quality control and performance testing.

6.2 An equipment submission shall be submitted for review, containing details on low density insulation on straight pipes runs, high density insulation at pipe supports, insulation for valves, flanges, etc. and insulation for storage vessels. For information required in the equipment submission, refer to Table F.

7 INSULATION MATERIALS/LIFE EXPECTANCY

7.1 The selection of an insulated material shall comply with the manufacturers operating limits for the insulation, including but not limited to criteria for temperature, humidity and compressive strength.

7.2 The materials selected for insulation, vapour barrier and cladding shall be compatible and suitable for the type of application, and shall be galvanic neutral.

7.3 The thickness shall comply as a minimum with the thickness stated in the enclosed table A – E.

7.4 Material selected shall have a median life expectancy of 20 years.

7.5 Insulation materials relying on reflectance and air gaps shall provide certified test results for reflective surface covered with dust and equivalent on site thickness of air gap.

7.6 Materials shall tightly fit the outer perimeter of the medium insulated.

7.7 Acceptable insulation materials for piping:

7.7.1 Pre-formed fibrous insulation sections (minimum density 80kg/m³)

7.7.2 Pre-formed closed cell foam (minimum density 32kg/m³)

7.7.3 Pre-formed closed cell elastomeric (minimum density 48 kg/m³)

7.7.4 Pre-formed Polystyrene (minimum density 15 kg/m³ inland & 20 kg/m³ coastal)

7.8 Acceptable insulation materials for pipe fittings:

7.8.1 Fibrous insulation rope with plaster finish

7.8.2 Closed cell elastomeric (min density 48kg/m³)

7.9 Acceptable insulation materials for ducting:

7.9.1 Blanket/sheet glass fibre (minimum density 16kg/m³)

7.9.2 Fire Retardant Polystyrene or equivalent (minimum density 24kg/m³)

7.9.3 Closed cell foam (minimum density 24kg/m³)

8 VAPOUR BARRIER

8.1 The insulation of ductwork, piping and or plant operating below ambient dew point temperature shall be provided with a vapour seal.

8.2 Wherever a vapour seal is discontinued the vapour seal shall be brought back to the surface of the duct, pipe or plant.

8.3 The vapour barrier shall be continuous at pipe supports.

8.4 Wherever a vapour seal is damaged or pierced it shall be sealed with tape of the same material.

8.5 Cold surface insulation relying on closed cell properties of the material for a vapour barrier shall have a minimum moisture resistance value of $\mu > 5000$.

8.6 Acceptable vapour barriers:

8.8.1 Foil Reinforced Kraft (FRK), duct wrap or equivalent, all joints sealed with aluminium tape

8.8.2 Mylar Foil factory fitted and all joints sealed with aluminium tape

8.8.3 Factory fitted PVC and all joints sealed with black tape

8.8.4 Factory fitted Canvass with all joints properly lapped and continuous sealed with canvass material and coated by a polymeric type vapour barrier strictly in accordance with the manufacturers' recommendation but a minimum of two coats, first a white coat, followed by a blue coat.

8.7 All vapour barrier joints (longitudinal and circumferential) shall have a minimum overlap of 50 mm and shall be glued and taped.

8.8 Exposed vapour barrier shall be UV resistant.

9 APPLICATION

9.1 GENERAL

9.1.1 Where specified thickness of insulation exceeds commercially available sizes, insulation shall be applied in two or more layers, with all joints staggered and with overlaps of minimum 50mm. Insulation layers shall be strapped and glued into position.

9.1.2 Where cladding is required in terms of this specification, the standard for inland environments shall be"galvanised sheetmetal" and for marine environments, stainless steel or aluminium.

9.1.3 Cladding shall be strapped at 300mm intervals – no pop rivets or screws shall be used.

9.1.4 Installation material used on duct work, piping and plant operating at or below ambient dew point temperatures or installed in areas where the insulation can be soaked by (rain) water shall be of the closed cell type and shall be provided with a vapour seal (refer Clause 6). All joints on cladding shall be weather proof.

9.1.5 Equipment manufacturer's nameplates shall not be covered by insulation.

9.1.6 Flanges, valves and strainers shall be insulated. Removable sections shall be insulated with synthetic rubber and taped.

9.1.7 Collars, bases and manholes of storage vessels shall be insulated. Manhole covers shall be semi removable. Storage vessel legs shall be insulated up to 50mm off the floor surface.

9.1.8 Heat exchangers shall be insulated.

9.1.9 Pumps and machinery shall not be insulated unless specifically indicated on the drawings.

9.1.10 All chilled water and refrigerant suction distribution systems shall be insulated and vapour sealed.

9.1.11 Cladding shall be compatible with the nature of material insulated and the vapour barrier. Where electrostatic build up or lightning strike is a possible given site conditions, cladding shall be earthed and bridged to ensure a continuous medium.

9.1.12 Cladding shall overlap a minimum of 30mm for <ø150mm pipes and 50mm for ≥ø150mm pipes.

9.1.13 To prevent thermal bridging at supports, insulation props of similar material, preformed to suit the pipe, sufficient density to support the pipe, fluid and coverings, and equal thickness to insulation shall be provided. Wooden blocks will not be accepted.

9.1.14 Material similar to Poly ISO Cyan Urate with a minimum density of 80kg/m³ and minimum length of 120mm can be used.

9.1.15 Minimum thickness specified in tables A – E, is based on thermal conductivity. The specialist insulation supplier should ensure that the correct thickness/density of material is used to prevent damage during construction and squashing at pipe supports.

9.1.16 Fixing of insulation shall allow for expansion of piping.

9.1.17 Condensate drain piping of equipment installed inside ceiling voids shall be insulated from the equipment to the drain point for a minimum distance of 2m or further if condensation is evident

9.1.18 Side stream filtration unit & piping and chilled water piping to and from dosing pod must be insulated.

9.1.19 External cladding and uninsulated sections of ducting that is exposed to rain shall be cross bend with the highest point in the centre of the ducting where installed horizontally to prevent standing water. No drilling of cladding on top of insulation is allowed.

9.1.20 External cladding seams of piping must be installed in a position that ensures there is no water ingress via the seam. The seam angle and overlap section must ensure efficient water run off and all joints must be water tight.

9.1.21 All insulated piping, including refrigerant piping shall be protected by a sheetmetal sleeve where it penetrates a structure and fire sealed if it is a fire wall.

9.1.22 When using preformed close cell foam insulation on piping a bonding medium similar to Bitumen must be used and applied over the protective coating that forms the basis of protection against corrosion.

9.1.23 The coverage of the Bitumen must be 100% of the insulated area.

9.1.24 All joints in insulation and termination against pipe supports must be glued.

9.1.25 Flexible connections shall not be insulated.

9.2 DUCTING

9.2.1 Refer to table D.

9.2.2 Duct insulation shall be fastened to ducting in accordance with the following table:

DUCT SIZE	FASTENERS
<300mm	Adhesive (100% coverage of area)
300mm ≤ duct <600mm	Adhesive and straps at 300mm centres
'≥ 600'mm	Adhesive and pins at 300mm centres

9.2.3 If strapping is used in the installation, it shall be applied without damaging the insulation. Strapping shall be of the polypropylene type. Locking clips shall be plastic.

9.2.4 Pins shall be applied to sides and bottom. Mechanical pin washer shall not compress insulation more than 15%. Sharp edges of mechanical pin washers shall face away from the insulation to prevent damage to the vapour barrier.

9.2.5 No pins shall be used after HEPA filter but only straps.

9.2.6 The vapour barrier shall be re-instated after installation of pins.

9.2.7 Adhesive shall be applied to the bottom and sides of the duct to ensure bonding of the insulating material to the sheet metal.

9.2.8 The table below details the spacing of the mechanical fasteners for rigid internal and external insulating material.

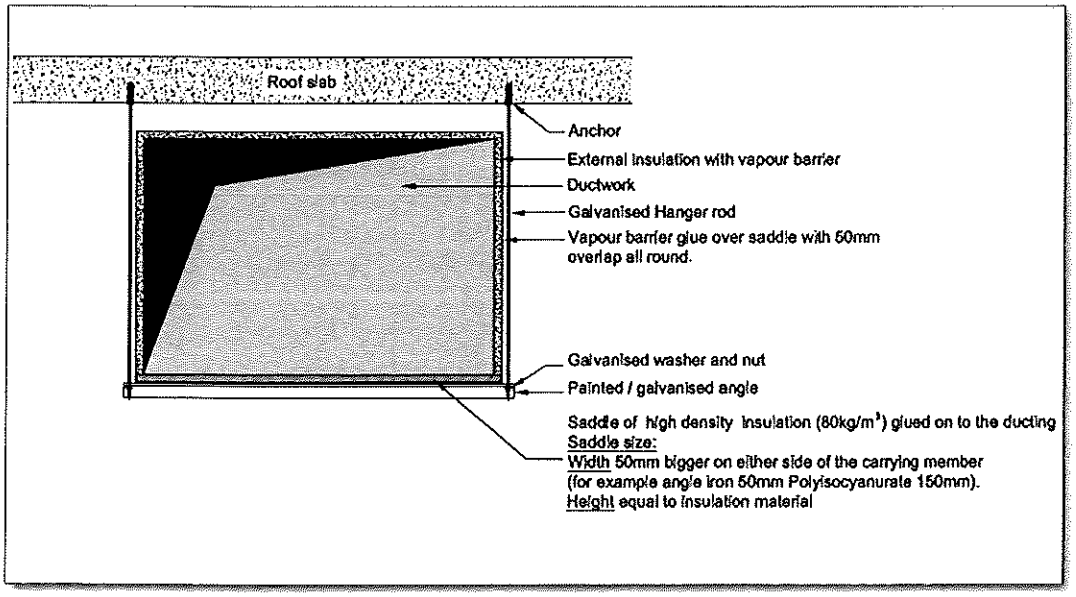
DUCT SYSTEM	SPACING OF MECHANICAL FASTENERS FOR EXTERNAL DUCT INSULATION		
Low. medium and high pressure	From Side of duct	From Flanges	Between Centres
	75mm	75mm	300mm

DUCT SYSTEM	SPACING OF MECHANICAL FASTENERS FOR INTERNAL DUCT INSULATION		
Low. medium and high pressure	From Side of duct	From Flanges	Between Centres
	75mm	75mm	400mm

9.2.9 Duct supports must not be against flanges/duct joints. Minimum distance from flanges/joints is 150mm.

9.2.10 At Coastal areas high density insulating material is required between the ducting and duct support bracket.

9.2.11 Ensure that the hangers and supports are large enough to allow the insulating material and the vapour barrier to be fitted between the duct and the hanger or support. Insert, between the duct and each hanger or support, a saddle of high density insulating material of acceptable quality, and of the same thickness as the insulating material with width at least equal to that of the carrying member (for example the angle). Ensure that the compressibility of the saddle material is such that, under working conditions, a saddle is not compressed to less than 85% of its original thickness. Bond the saddle onto the duct with 100% coverage of adhesive (refer to figure below for details. Fit saddles on all load-bearing surfaces of the external insulating material.



9.2.12 As an alternative to transverse joints specified in SANS 1238 the flanged joints such as MEZ-flanges will also be considered provided that these type of flanges meet the following specification.

LONGEST SIDE OF DUCT (mm)	FLANGE HEIGHT (mm)	MATERIAL THICKNESS OF FLANGES	NO OF INTERMEDIATE CLAMPS
100 – 300	20	1mm	Nil
300 – 600	20	1mm	1
601 – 1200	20	1mm	2
1201 – 1800	30	1.2mm	3
1801 – 2400	30	1.2mm	4
OVER 2400	TO SANS 1238		

9.2.13 MEZ-flanges or equivalent products shall be manufactured from cold rolled steel and hot-dip galvanised after manufacture. The sealant between mating flanges and between the flange and sheet-metal shall comply with SANS 1238.

9.2.14 Ductwork connected to equipment, such as cooling towers, evaporative condensers, plenum chambers etc. shall be provided with flanges for easy removal of the equipment.

9.2.15 "Where ducting passes through walls or partitions it shall have a suitable timber frame surrounding it. There shall be a 10mm clearance between all sides of the ducting and the timber frame."

9.2.16 Strapping must not be used on bends and transformation sections. Mechanical pins must be used.

9.2.17 Where thermal bridging occurs on the flanges of double-skin ducting the flanges must be insulated, vapour-proofed and cladded. The cladding is to be strapped to the double-skin ducting i.e. no penetrations shall be made in the double-skin ducting to fix the cladding. The insulation of the flanges shall be of the same type and thickness as the insulation used inside the double-skin ducting.

9.3 CHILLED WATER INSULATION

9.3.1 Refer to table A.

9.3.2 Flexible closed cell rubber insulation shall be cladded with sheetmetal if used on:

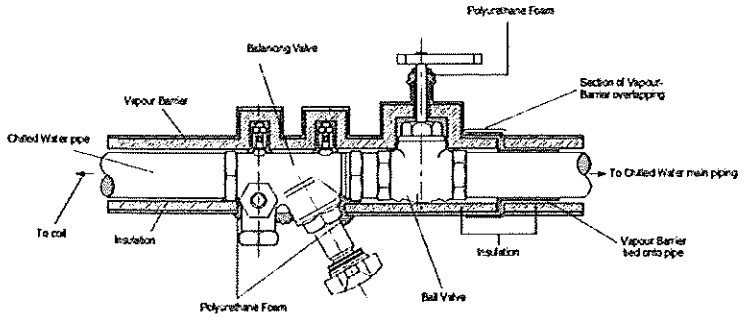
- Chilled & hot water piping that are exposed to the elements,
- Within one meter distance from florescent light tubes and
- Close or near to heat generating equipment.

9.3.3 Special Clauses for Coastal Application

The "Coastal Conditions" or "Coastal Application" shall be deemed to mean any installation within 35km of the ocean. For Coastal Conditions the following apply:

- The vapour barrier must be sealed directly onto the chilled water pipe after the valve cluster of the cooling coil. This also applies where balancing valves or ball valves are used or flexible hose connections.

The insulation should overlap the vapour barrier. The vapour barrier must remain continuous on the outside of the pipe



Where good thermal conducting vapour barrier such as aluminium foil is used, the foil should not come into contact with the pipe, but polyurethane foam or other closed cell insulation should rather be injected to seal the vapour barrier off, onto the pipe, after the valve cluster.

9.3.4 Refer to Section 09.02 for correct installation of balancing valve in pipe system.

The following vapour barrier materials are acceptable:

- Mastic PK2415
- SAFBOND cloth type
- Foil to Mylar

The following type of vapour barrier are not acceptable:

- Foilcraft

9.4 HOT WATER INSULATION

9.4.1 Refer to table B

9.4.2 Hot insulation shall provide adequate heat conservation and protection against burn injuries. Insulation surface temperature shall not exceed 50°C at an ambient of 30°C.

9.5 REFRIGERANT PIPING

9.5.1 Refer to table E.

9.6 STEAM

9.6.1 Refer to table C.

10 ACCEPTABLE CONTRACTORS

10.1 Insulation shall in all instances be applied by specialist "Insulation Contractors" and be of the highest standard. The Insulation contractor must be approved by the Engineer

TABLE A

	CHILLED WATER (INLAND CONDITIONS)					
DIAMETER	Minimum R Value	MINIMUM THICKNESS/ THERMAL CONDUCTIVITY			VAPOUR BARRIER	LOCATION/FINISH
	m²K/W	0.038 – 0.05	0.034 – 0.038	0.022 – 0.024		
15-50	0.5	25	19	15	Refer to section 04 clause 8	***Concealed – Vapour Barrier*** Exposed - 0.5mm galvanised sheet metal painted to an approved colour. External cladding arranged to shed water and all joints water tight. Tanks – 0.6 mm cladding.
65-80	0.66	40	25	20		
100 - 300	0.79	50	30	20		
>=350 "header"	1.32	100	50	50		
storage tanks	2.6	150	100	75		

	CHILLED WATER (COASTAL CONDITIONS)					
DIAMETER	Minimum R Value	MINIMUM THICKNESS/ THERMAL CONDUCTIVITY			VAPOUR BARRIER	LOCATION/FINISH
	m²K/W	0.038 – 0.05	0.034 – 0.038	0.022 – 0.024		
15 - 22	0.66	40	25	20	Refer to section 04 clause 8	***Concealed – Vapour Barrier*** Exposed - 0.5mm aluminium sheet metal painted to an approved colour. External cladding arranged to shed water and all joints water tight. Tanks – 0.6 mm cladding
25 - 40	0.79	40	30	20		
50 - 100	1.0	50	38	25		
150 - 300	1.32	N/A	50	40		
>=350	2.0	N/A	75	50		
Storage tanks	2.6	n/a	100	75		

TABLE B

	HOT WATER					
DIAMETER	Minimum R Value	MINIMUM THICKNESS/ THERMAL CONDUCTIVITY			VAPOUR BARRIER	LOCATION/FINISH
	m^2K/W	0.038 – 0.05	0.034 – 0.038	0.022 – 0.024		
15 - 32	0.5	25	19	NA	None for interior and exterior	*Concealed – Canvas* Exposed - 0.5mm galvanised sheet metal painted to an approved colour. External cladding arranged to shed water and all joints water tight.
40 - 100	0.5	25	19	NA		
125 - 200	0.6	30	25	NA		
> 200	0.77	40	30	NA		

TABLE C

	C: STEAM AND CONDENSATE RETURNS					
DIAMETER	Minimum R Value	MINIMUM THICKNESS/ THERMAL CONDUCTIVITY			VAPOUR BARRIER	LOCATION/FINISH
	m^2K/W	0.038 – 0.05	0.034 – 0.038	0.022 – 0.024		
15 - 32	0.66	25	25	NA	None for interior and exterior	***Concealed – Vapour Barrier*** Exposed - 0.5mm galvanised sheet metal painted to an approved colour. External cladding arranged to shed water and all joints water tight.
40 - 100	0.79	40	30	NA		
125 - 200	1.0	50	40	NA		
≥ 200	1.6	80	60	NA		

TABLE D

	EXTERNALLY INSULATED DUCTING (No internally insulated ducting will be accepted unless specifically approved by the Engineer)					
SIZE	Minimum R Value	MINIMUM THICKNESS/ THERMAL CONDUCTIVITY			VAPOUR BARRIER	LOCATION/FINISH
	m^2K/W	0.038 – 0.05	0.034 – 0.038	0.022 – 0.024		
All interior	0.5	25	19	12	Refer to section 04 clause 8	***Concealed – Vapour Barrier*** Exposed - 0.6mm galvanised sheet metal painted to an approved colour. External cladding arranged to shed water and all joints water tight, or double skin with vapour barrier
All exterior	1.0	50	40	25		

TABLE E

REFRIGERANT PIPING					
SIZE	MINIMUM THICKNESS/ THERMAL CONDUCTIVITY			VAPOUR BARRIER	LOCATION/FINISH
	0.038 – 0.05	0.034 – 0.038	0.022 – 0.024		
≤ 100	NA	25 interior 30 exterior	15 interior 25 exterior	None for inside Refer to section 04 Clause 8 for outdoor installation	***Concealed – Vapour Barrier*** Exposed – in GMS trunking
>100	NA	40	40		

TABLE F

EQUIPMENT SUBMISSION INFORMATION REQUIRED			
Item	**Description**	**Minimum Requirement**	**Tendered**
A	Signed off specification	Included	
B	The type of material/trademark of the material, volumetric mass in Kg/m³, operating range	Included	
C	The coefficient of thermal conductivity in W/m°C (stabilized over time)	To suit material and thickness	
D	Confirmed thickness of insulation	To suit material and k-value	
E	Coefficient of thermal expansion in mm per °C	To suit installation method statement	
F	Water/moisture absorption properties	Absorb <1% of weight in moisture	
G	Compressive strength	To suit material and thickness	
H	Confirm compliance with codes (section 2)	Complies fully	
I	Confirm compliance with fire specification (section 3)	Complies fully	
J	Confirm compliance with environmental specification (section 4)	Complies fully	
K	Minimum surface temperature in °C and confirmation that surface condensation will not occur.	To suit material and thickness	
L	Maximum surface temperature in °C	< 50°C	
M	Expected heat gain/loss to end of typical pipe/duct run	<2.5% of capacity for piping <10% of capacity for ducting	
N	Detailed installation method statement	Included	

The Subcontractor shall be responsible for the rectification of any excessive noise and/or vibration caused by the operation of the air conditioning and ventilation system installed under this subcontract.

The Subcontractor shall be responsible for the detail design of concrete inertia blocks, if required or specified, but such blocks will be provided by others.

The Subcontractor shall be responsible for the detailed selection and design of bases and isolator in conformance with the requirements specified in latest ASHRAE – Handbook-HVAC Applications – Section 48 - Noise and Vibration Control - Guide for Selection of Vibration Isolators.

1 ISOLATION OF MECHANICAL EQUIPMENT

1.1 All equipment shall be orientated or screened in such a way that maximum sound radiation patterns are directed so as to cause least disturbance.

1.2 All rotating machinery shall be balanced. The critical speed shall be at least 20% above the operating speed.

1.3 Vibration isolation mountings shall be provided for all vibration inducing equipment and associated pipe work and ducting. Mountings shall be installed in accordance with the manufacturer's instructions. However, the Subcontractor shall be responsible to ensure that amplitude of motion and vibration transmission will not exceed the specified limits.

1.4 Floor mounted equipment shall be erected on a concrete plinth, which shall protrude at least 25 mm above finished screeded floor level.

1.5 Isolators shall be selected to give both horizontal and vertical flexibility (compression and shear). The amplitude of motion due to operation of the supported equipment shall not exceed 3 mm.

1.6 Spring isolators shall be designed and installed in such a way that the ends of the springs are constricted to remain parallel during deflection. For stability, the outside diameter of springs shall be at least equal to their compressed height at rated load. Springs shall have a minimum additional travel to solid, equal to 20% of the rated deflection. Each spring mounting shall be set on 7 mm thick neoprene acoustical pads.

1.7 Ceiling mounted equipment must be provided with AV mountings as per suppliers instructions.

1.8 Vibration isolation mounts for axial fans are to be secured by bolting it into position i.e. to a fixed steel/concrete structure. Care is to be taken not to drill through water proofing.

2 ISOLATION OF PIPING AND DUCTS

2.1 All connections to equipment shall be sufficiently flexible to prevent excessive strain to allow the equipment freedom to move and to prevent plant vibration being conducted. Initially, special flexible connection may be omitted in a piping system and use shall be made of natural flexibility of resilient hangers or mountings for vibration isolation. However, flexible connections shall be inserted and other necessary adjustments be made, at the Subcontractor's expense, should the need arise.

2.2 All ductwork and piping within 15 m from connected vibration-inducing equipment shall be hung on resilient hangers. The first four hanger supports shall be capable of supporting piping at a fixed elevation during installation and, in addition, shall have a secondary adjustment to transfer the load to the spring element within the mounting, after the system has been filled with water.

2.3 The Subcontractor may be required to disconnect the piping after the installation is completed to demonstrate that no strain is exerted at the connections to the equipment.

2.4 Noise suppressors shall be installed downstream of all steam pressure reducing valves.

2.5 Where piping and ductwork passes through walls, floors or ceilings or plantrooms, acoustical seals shall be employed to confine airborne noises to the inside of such rooms.

3 SOUND ATTENUATION

3.1 Sound attenuating units or treatment shall be provided as indicated and/or required to control the noise from air conditioning and ventilation systems to within the limits specified.

3.2 It should be noted that the provisions for sound attenuation shown on the Engineer's drawings (or the absence of same) are based on average published data for equipment noise and inherent attenuation. The Subcontractor shall, nevertheless produce his own calculations, and select isolators/isolating methods following a recognised certified method and Guidelines - ASHRAE Systems Volume Chapter 32 for noise levels in the areas specified for the sound power of the actual selected equipment, and provide additional silencing equipment and/or treatment if necessary.

3.3 To minimise the need for sound attenuation, fans shall be selected to operate near their maximum efficiency point when producing the required air quantity and static pressure.

3.4 Sound attenuators and acoustic treatment in ducts shall be fire, fungus and erosion proof.

3.5 "Package" attenuators shall normally be flanged for bolted connections, and flexible duct connectors shall be used as shown or required.

3.6 Attenuators shall have an air resistance not exceeding 75 Pa measured at sea level at maximum air quantity.

3.7 Attenuating material must be fixed, glued and covered to supplier's specification to prevent decay of material in air stream.

3.8 The attenuator entering face profile must be curved in order to reduce possibility of air noise and reduce pressure drop across attenuator.

4 NOISE MEASUREMENT

4.1 The Subcontractor shall submit sound pressure levels measured on the completion of the installation, detailing the sound pressure levels in dB (re: $2 \times 10^{-5} N/m^2$), for the seven International Standard Octave Bands measured by means of a sound meter in at least six (6) areas within the building, as selected by the Architect.

4.2 Measurements for sound pressure level data shall be taken by the Subcontractor, or at his expense by an approved organisation, under full or nearly full cooling and air flow conditions.

1 ENERGY CONSUMPTION AND MAINTENANCE COSTS

1.1 The annual cost of energy consumed and total annual maintenance and service costs are an essential input in the adjudication process to select the appropriate equipment/tender. The selection will be based on the lowest total life cycle cost for a 15 year period. The present day tender price which might be used in comparing the various tenders is based on the application of a present day cost formula which allocates the appropriate influence to:

1.1.1 Initial Capital Cost.

1.1.2 Estimated Annual Electricity Costs.

1.1.3 The Annual Maintenance Costs.

1.1.4 The Average Interest Rate.

1.1.5 The Estimated Energy Costs Escalation Rate.

1.1.6 The Estimated Labour and Material Escalation Rate (Consumers Index).

1.2 Because initial cost is not the only determining factor, tenderers are advised to carefully consider energy efficiency and quality of equipment offered, if requested in the Schedules of Components and Equipment.

SUBJECT : IN-LINE DUCT FAN

PART C1.5 SECTION 08.03

1. FUNCTIONAL PERFORMANCE

1.1 OPERATING RANGE

1.1.1 The operation point shall be in the stable part of the curve.

1.2 SAFETY

1.2.1 Fan motor shall be non-overloading at any operating point.

1.2.2 Safety protection shall be provided for the motors as follows, unless otherwise specified:

- Single phase motors - Thermal overload protection.
- Three phase motors - Combined thermal overload and phase failure protection.

2. RELIABILITY AND AVAILABILITY

2.1 DOWN TIME

2.1.1 Fans shall be so installed that replacement shall not take longer than 2 hours when executed by qualified building maintenance staff [Refer PART C4.7].

2.2 DOCUMENTATION

2.2.1 The Subcontractor shall submit service, maintenance, trouble shooting, testing, installation and start-up instructions in order to obtain acceptance approval. Documentation shall be indexed in accordance with the equipment part of the O & M Manual [Refer Part C1.5 section 18].

3. TECHNICAL RESTRAINTS

3.1 Fan shall be complete with standard flanges on both sides for square type duct fans, and be suitable for standard size flexibles for round type duct fans.

3.2 Bearings shall be of the permanently lubricated type.

3.3 Fan assembly shall be statically and dynamically balanced at the manufacturer's works within the design operating speed range.

3.4 Air flow arrow shall be installed.

3.5 Fan shall be direct driven, suitable for mounting at any angle and mounted on vibration isolation mountings.

3.6 Motor rating shall not be less than the maximum power required by the fan at any operating point between zero and break-off capacity.

3.7 Fan casing shall be insulated with high density acoustic insulation to limit break out noise to the occupied space.

3.8 The fan motor shall be provided with manually adjustable speed controller to deliver the specified air quantity.

4. BUILDING RESTRAINTS

4.1 Fan assembly shall be installed in accordance with manufacturer's recommendations.

4.2 Anchors that were not installed to the suppliers recommended procedures will not be accepted.

4.3 Washers shall be fitted to each nut and bolt.

5. "MEASUREMENT" TO CONFIRM EQUIPMENT COMPLIANCE WITH SPECIFICATION

5.1 Subcontractor shall supply the necessary field testing instruments and detailed description of field testing arrangement to prove a capacity/performance measurement accuracy of +- 5% for the Fan Acceptance Testing.

5.2 Certified test results shall be plotted on the official published and certified equipment performance graph/table to confirm that claimed performance is achieved.

5.3 The various tests as required by the Quality Management System shall be demonstrated and accessible to the Engineer at all times for monitoring.

6. SCHEDULE

6.1 Refer layout drawings for schedules.

6.2 All figures given are for an altitude as specified in Part C3.1.

6.3 Pressure and absorbed power figures are for tendering purposes only and are to be confirmed at time of equipment submission.

1. FUNCTIONAL PERFORMANCE

1.1 OPERATING RANGE

Provision must be made for the damper to be closed and/or opened remotely if specified as such in the schedule. Under closed conditions, the leakage rate shall not be higher than is specified in the schedule.

2. RELIABILITY AND AVAILABILITY

The damper shall be so installed that replacement shall not take longer than 2 hours when executed by qualified building maintenance staff.

2.1 MEAN TIME BETWEEN FAILURES

The minimum acceptable service life is 15 years with 3 000 operating hours per annum and 50 000 control cycles per annum with a maximum deviation from this standard for 15% of the total number of items.

2.2 COMPREHENSIVE SERVICE AND MAINTENANCE CONTRACT

Only suppliers/manufacturers who offer and submit proof that they can honour a 5 year comprehensive maintenance contract (renewable for another 5 years at the option of the building owner) will be considered as acceptable suppliers.[Refer PART C4.7]

2.3 DOCUMENTATION

Supplier of unit shall submit service, maintenance trouble shooting, installation and testing instructions in order to obtain acceptance approval. Documentation shall be indexed in accordance with the equipment part of the O & M manual [Part C1.5 Section 18].

3. TECHNICAL RESTRAINTS

3.1 The damper blades shall be aerofoil shaped and manufactured from aluminium.

3.2 A mechanical stop shall be provided to prevent accidental damage to the damper blades as a result of maladjustment of controllers or actuators.

3.3 The damper casing shall be insulated to the same specification as for the ductwork of which it forms part of.

1. TECHNICAL RESTRAINTS

1.1 The fan filter unit (FFU) shall in principle be equal or similar to the "KLEEN-PAK" packaged filter unit as manufactured by LUFT INDUSTRIES.

1.2 Filter frame shall be suitable for standard commercial range of filter elements and filter media available.

1.3 Air filter gauge - type Magnahelic or equal approved - shall be provided for each filter bank.

1.4 Adequate access shall be provided for changing filters.

1.5 The filter elements and filter frame shall be fully corrosion protected and be weather and water proof.

1.6 The filter shall be so constructed that the pleated material contained within the frame will remain configured for maximum dust holding and ease of cleaning. Should the function of the filter be in any way permanently impaired, then it shall be replaced by the subcontractor.

1.7 Construction of filter frame and method of holding down filter elements shall ensure no passage of unfiltered air through filter bank.

NOTES

1. Refer page 2 of 2 Section C3.3 of Section 11.02.01 for performance schedules.

2 All figures given are for an altitude as specified in Part C3.1.

3. Resistance figures are for tendering purposes only and are to be confirmed at time of equipment submission.

2. SCHEDULE – FAN FILTER UNIT

Identification	Refer Note	Units	Tender	Offered	Tender	Offered
- Identification No:						
- Drawing No. Reference						
- No. off						
Supply Fan						
- Flow rate - maximum		(m^3/s)				
- Fan total static pressure	2	(Pa)				
Pre-Filter						
- Air flow rate		(m^3/s)				
- Maximum velocity		(m/s)				
- Efficiency		(%)				
- Arrestance		(%)				
- Initial resistance		(Pa)				
- Final resistance		(Pa)				
Main Filter						
- Air flow rate		(m^3/s)				
- Maximum velocity		(m/s)				
- Efficiency		(%)				
- Arrestance		(%)				
- Initial resistance		(Pa)				
- Final resistance		(Pa)				
Heater (Electric)						
- Air flow rate		(m^3/s)				
- Capacity		(kW)				
- No. off control steps						
Power Supply						
- Volt/Phase/Frequency		(V/Ph/Hz)				
Equipment absorbed power at design conditions						
- Supply air fan motor		(kW)				
- Heater (Electric)		(kW)				

NOTES

1. All figures given are for an altitude as specified in Part C3.1.
2. Estimated for tendering purposes only. To be confirmed at time of equipment submission.
3. As per ASHRAE 52-76.

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 18

WET SERVICES TECHNICAL SPECIFICATION

PART C3

SCOPE OF WORK

PART C3.2

WET SERVICES - STANDARD SPECIFICATION

STANDARD TECHNICAL SPECIFICATION for PLUMBING/ DRAINAGE

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1 GENERAL

1.1 The standard specifications included define the standard of equipment and materials, as well as the quality of the services required for the various sections of the installation. Not all the clauses in this section of the standard specification shall necessarily be applicable on the contract. Refer to the detailed or material specification for materials and equipment to be used.

1.2 The contractor shall, at all times, adhere to this specification, unless otherwise specified on the drawings and / or in the detailed specifications.

1.3 The Engineers' drawings show broad principles of design, general layouts, schematic arrangements and when read together with the specifications and the drawings of other disciplines and other contractors, they carry sufficient information to enable the contractor to determine how the installation is to be installed, operated, serviced and maintained.

1.4 Pipe sizes and possible positions are shown on the Engineers' drawings. Fittings, valves, strainers, etc., must adapt to these pipe sizes.

1.5 The contractor shall submit workshop drawings, samples, catalogues, performance characteristics, etc., on all equipment, except when specifically included by the Engineer.

1.6 The contractor shall take in situ measurements for installation of the equipment of the system and produce complete workshop drawings for fabrication and installation. These drawings shall be co-ordinated by the contractor with all other relevant equipment and services. Dimensions given on the Engineers' drawings are only a guide and should be adapted to suit the relevant measurements of the specific fittings and / or equipment.

1.7 All references to SANS or SABS standards and specifications shall be the latest available versions. Outdated references to be replaced with updated versions. It is the contractor's responsibility to ensure the latest version is used and the system is fully complaint.

2 DEFINITIONS AND ABBREVIATIONS

2.1 DEFINITIONS OF TERMS USED HEREIN:

"Provide"	:	to supply, install and connect up, complete and ready for safe and regular operation particular work referred to, unless specifically indicated or specified otherwise.
"Install"	:	to erect, mount and connect complete with all related accessories.
"Supply"	:	to purchase, procure, acquire and deliver complete with all related accessories.
"Work"	:	all labour, materials, equipment, apparatus, controls, accessories and other items required for proper and complete installation
"Concealed"	:	embedded in masonry or other construction, installed in furred spaces within double partitions or hung ceiling, in trenches, in crawl spaces or in enclosures.
"Exposed"	:	not installed underground or "concealed" as defined above
"Indicated", "Shown" or "Noted"	:	as indicated, shown or noted on drawings and / or specifications.
"Similar" or "Equal"	:	of approved manufacture, equal in materials, weight, size, design and efficiency of specified product as approved by the engineer at tender stage.
"Approved", "Satisfactory", "Accepted" or "Directed"	:	as approved, satisfactory, accepted or directed by the Engineer

2.2 ABBREVIATIONS:

"SABS"	:	The South African Bureau of Standards and the number following shall refer to the latest amendment of the relevant specification or Code of Practice as the case may be.
"SANS"	:	South African National Standard
"BSS"	:	British Standard Specifications.
"NB"	:	Nominal Bore.
"WWP"	:	Water Working Pressure.
"WOG"	:	Water, Oil, Gas.
"PB"	:	Polished Brass
"CP"	:	Chromium Plated
"PIRB"	:	Plumbing Industry Registration Board.
"CKS"	:	Co-ordinating Specifications issued by the Central Co-ordinating Committee under the auspices of the South African Bureau of Standards.
"CSIR"	:	Council for Scientific and Industrial Research.

2.3 DIAMETERS OF PIPES:

2.3.1 All diameters of pipes given are the nominal bore or external diameters in accordance with the normal conventions of the materials being used.

3 CODES OF PRACTICE, LAWS AND STANDARDS

3.1 All workmanship and materials used in the execution of the works shall be of the highest class and, where not fully covered by the Specification, shall be carried out in conformity with best modern practice, as determined by the National Building Regulations & Compulsory National Water Act standards or otherwise rationalised by the Engineer.

3.2 It shall be the contractor's responsibility to ensure that the entire installation fully complying with all relevant requirements of governmental and Local Authorities whose jurisdiction embraces the location of the Site of the Works and the equipment provided for those installations which shall comply in every respect with the National Building Regulations and Building Standards Act, Act 103 of 2010 and the Occupational Safety Act, Act No. 6, both as amended to date, excepting only where exemption from any such regulations has first been obtained in writing from the said authorities, provided that the approval of the Engineer has been given prior to application for any exemption.

3.3 All materials and equipment supplied and installed shall carry the SABS mark of approval, as well as Jaswic registered unless otherwise specified or agreed to in writing by the Engineer. Where alternatives are offered, the submission is to include full details of the item, together with tests and compliances with any other standards.

3.4 All electrical wiring shall comply with the latest edition of the Standard Regulations for the wiring of Premises, SANS 10142 and the additional requirements of any local authority who has jurisdiction over the Site of Works, as well as being in accordance with best modern practice.

3.5 Wherever relevant, the Specification shall be understood to be amplified to embrace Codes of Practice, Regulations and Standards promulgated by Government & recognised authorities in the field of Plumbing and Drainage Technology and all other branches of engineering science applicable to this project.

3.6 It shall be assumed that the contractor is conversant with the above mentioned requirements. He/she shall be in ownership of such documentation. Should any requirement, by-law, or regulation, which contradicts the requirements of this document, apply or become applicable during the erection of the installation, such requirement, bye-law, or regulation shall overrule this document and the contractor shall immediately inform the Engineer of such a contradiction. Under no circumstances shall the contractor carry out any variations to the installation in terms of such contradictions without obtaining written permission to do so from the Engineer.
It shall be the responsibility of the contractor to make the necessary arrangements at his own expense with the local supply authority and to supply the labour, equipment and means to inspect, test, commission and to hand over the installation.

3.7 The Sub-contractor shall supply and install all Notices and Warning signs that are required by the appropriate laws, regulations and / or by this document.

4 ORGANISATION AND STAFF CONTRACT

4.1 In addition to the site supervisor and / or foreman, the contractor shall employ as many competent and experienced persons as may be necessary for the purpose of the contract and shall be bound to remove from the contract works any person to whom the employer or his agent or the principal contractor may reasonably object by reason of any failure, neglect, incompetence or substandard work execution by or under the supervision of such person. PIRB membership is recommended.

4.2 The duties and responsibilities of the contractor's management staff shall include, but not be limited to the following:

4.3 Selections of equipment and components into working assemblies for conformance with the design concept in the sub-contract specification.

4.4 Submissions of equipment and installation drawings for approval in accordance with the required procedure.

4.5 Programming and planning of the work to fit in with the overall principal contractor's programme. An installation program and procurement schedule to be provided to the engineer by the plumbing contractor.

4.6 Attendance at routine site progress meetings and programme monitoring meetings organised by the principal contractor.

4.7 Conducting of all tests & commissioning as required.

4.8 Expediting of the work.

4.9 Directing his employees to ensure efficient, timely and safe execution of the work, and co-operation with the principal contractor and other trades to ensure such execution.

4.10 Attendance at meetings from time to time with the Engineer in order to discuss any technical matters that need clarification.

5 CO-ORDINATION WITH OTHER TRADES

5.1 The contractor shall acquaint himself with the general arrangement of all other services and ensure that in fixing the work, it will not obstruct the fixing or future maintenance of the contract works or other services.

5.2 He shall also fully co-operate with other trades and take all reasonable precautions to ensure that he does not impede the progress of, or damage their work.

6 TEST AND INSPECTION PRIOR TO COMPLETION

6.1 Except where otherwise provided in the contract, the contractor shall provide all labour, materials, power, fuel, accessories and properly calibrated and certified instruments necessary to carry out such tests. Arrangements for such tests shall be made by the contractor and he shall give at least 72 hours' notice to the Engineer, in writing, of the test prior to commencement.

6.3 In the event of the plant or installation not passing the test, the employer shall be at liberty to deduct from the contract price all reasonable expenses incurred by himself, or his agents attending the repeated tests.

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

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

6.6 After complete installation of the system, all equipment shall be tested, adjusted and readjusted until it operates to the satisfaction and approval of the Engineer and the client, in compliance with the manufacturer's specifications.

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

6.8 The water reticulation system shall be pressure tested and kept operational and live floor by floor and section by section as the project progresses. Testing shall be conducted according to SANS 10252-1 and commissioning according to ASHREA unless otherwise stated by the Engineer. The sanitary drainage system shall be tested according to SANS 10252-2.

7 SHOP DRAWINGS

7.1 The sub-contractor shall prepare, at his own expense, and shall submit copies of shop drawings for all fabricated work, working or setting out drawings, shop details and schedules to the Owner's representative for approval as stated below, and related work shall not be performed by the sub-contractor until such approval has been given.

7.2 As soon as approval has been given, the sub-contractor shall furnish the Owner's representative two prints of the approved shop drawings, setting out drawings and schedules. The sub-contractor shall also furnish to the Works as many prints of the approved shop drawings and schedules as are required. No work shall be performed from shop drawings and / or catalogues not stamped with the Owner's representative's approval, and such stamped drawings and / or catalogues shall be kept available at the job site as evidence of such approval.

7.3 The sub-contractor shall be responsible for dimensions, design of adequate connections, details for the satisfactory construction of all work and the furnishing of materials for work required by the sub-contract even if not indicated on the submissions that have been approved by the Owner's representative.

7.4 The Owner's representative will check drawings for design only and approval of the drawings, schedules and catalogues by the Owner's representative shall not be construed as a complete check and shall not relieve the sub-contractor of his responsibility as above stated. If the submissions differ from the requirements of the sub-contract, the sub-contractor shall make specific mention of each difference in his letter of transmission, with a request for substitution, together with his reasons for same, in order that, if acceptable, suitable action may be taken by the Owner's representative. Otherwise, the sub-contractor will not be relieved of the responsibility for executing the work in accordance with the requirements of this sub-contract.

7.5 Corrections of shop drawings by the Owner's representative are not intended to change the scope of work. Should any such corrections constitute a change of scope of work, the sub-contractor shall notify the Owner's representative in writing within not more than seven calendar days of such change and shall not proceed with the fabrication until so authorized by the Owner's representative. Claims for change of scope, made after performance of the work constituting the claimed change of scope, will not be considered.

8 "AS-BUILT" DRAWINGS AND MANUFACTURERS INFORMATION

8.1 The sub-contractor shall provide the Engineer with a complete signed set of "as-built" drawings, together with stored drawings in DWG electronic format as a pre-requisite to final payment; and the Engineer shall hand the set over to the Owner after having established their correctness. The "as-built" set shall include all mechanical and electrical equipment installed in the works.

8.2 Where possible, a copy of Architects' or Engineer's drawings shall be used and the sub-contractor may purchase copies of the necessary drawings from the relevant party. If "as-built" variations cannot be clearly shown thereon, then the sub-contractor shall prepare supplementary hand marked drawings that will properly impart the necessary information. Manufacturer's and sub-contractor's shop drawings shall be corrected to correspond with the "as-built" drawings and copies of each shall also be furnished to the Engineer.

8.3 "As-built" drawings shall be maintained on a current basis as work progresses, and all deviations in work as actually installed accurately entered, at least once a week, on paper prints of design drawings affected, with such prints kept available at the site for the inspection of the Engineer. At the end of each month, the record for the month, properly identified by notes, shall be transferred to the original drawings by competent draughtsmen. Within seven days after the end of each monthly period, submit to the Engineer one paper print of each drawing affected, showing the latest corrections.

9 OPERATING AND MAINTENANCE

9.1 The contractor shall submit 3 (three) sets of comprehensive operating and maintenance manuals to the Engineer, after first obtaining his approval thereof.

9.2 The operating and maintenance manuals shall at least contain the following as further described in Part 3.3. O&M Manual Requirements:

(i) A description of the system, together with details and specifications of all equipment and items used in the works.

(ii) Detailed instruction in the operation of the system.

(iii) Details and schedules of how and when to maintain the plant and equipment.

(iv) List of spares to be carried, complete with part numbers and supplier(s) of equipment.

(v) Names and addresses of staff of the contractor or supplier(s) to be contacted in case of an emergency, etc.

(vi) Guarantees for all equipment and fittings, etc.

(vii) All commissioning documents signed by the Commissioning Agent & Engineer.

10 QUALITY ASSURANCE SYSTEM

10.1 The contractor shall institute an approved Quality Assurance system (QA) which shall be submitted to the Engineer for his approval. The records of this QA system shall be kept throughout the duration of the contract and shall be submitted to the Engineer at regular intervals as required by the Engineer.

10.2 The plumbing staff is to be trained and certified by the manufacturer, that they meet the requirements and standards of the pipe manufacturer to install the plastic pipe installation as per the manufacturer's specifications and requirements.

10.3 The manufacturer is to provide a dedicated person, who will monitor the pipe installation as it progresses, providing quality control, inspection reports.

11 OPERATING AND COMMISSIONING OF PLANT AND INSTALLATION

11.1 The completed system shall be put into operation after all tests and adjustments have been carried out to the satisfaction of the Commissioning Agent & Engineer. The contractor shall run and operate the system for a period of time as specified by the Engineer and train the staff of the client to operate and maintain the system for a period as required by the Engineer, which will not exceed one month.

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

11.3 The contractor shall submit a full commissioning report or certificates.

12 GUARANTEE OF INSTALLATION AND EQUIPMENT

12.1 The contractor shall obtain guarantees from the manufacturer(s) and / or supplier(s) to the effect that each piece of equipment shall comply with the required performance and also that it will function as part of the complete system.

12.2 All equipment, including the complete installation and the system as a whole, shall be guaranteed for a period of 12 (twelve) months after the written acceptance by the Engineer of the completed and operational system.

12.3 The manufacturer shall provide an insurance cover of the product.

12.4 The plumbing contractor shall provide an insurance cover for the plumbing installation.

13 MAINTENANCE OF THE INSTALLATION DURING THE PERFORMANCE GUARANTEE PERIOD

13.1 The contractor shall furnish, free of charge, all maintenance on the entire equipment supplied by him for the guarantee period. Maintenance shall include systematic examination and adjustment of all this equipment at least every 3 months. The contractor shall, in the course of such maintenance or on call during the maintenance period, repair or replace defective parts as required and shall use only genuine standard parts produced by the manufacturer of the original part. Renewals or repairs resulting from misuse of drains, Hot & Cold system & wear and tear, however, shall not be made at the expense of the contractor where certified as such by the Engineer. Specified spares (Attic stock) shall not be used during this period. If any spares are used due to operational necessity and with the Engineer's permission, such spares shall be replaced by the contractor.

13.2 The maintenance period shall only begin with completion of the Main Contract or parts thereof agreed by all parties and when the Engineer has certified the contract works as completed, unless otherwise specified.

14 COMPLETION OF CONTRACT WORKS

14.1 Completion of the contract works will only occur after the following procedure has been certified by the Engineer as having been carried out in accordance with the specification.

a) Physical completion of all systems has been reported to the principal contractor by the contractor, and all defects made good. The principal contractor to satisfy himself that all work has been completed satisfactorily before reporting to the Engineer.

b) Acceptance tests have successfully taken place as specified and test results have been witnessed (where required), recorded and approved by the Commissioning Agent & Engineer.

c) "As-built" drawings, commissioning reports and maintenance and operation manuals have been submitted to and approved by the Engineer.

d) The employer's nominated operator(s) has received instruction in the operation of the contract works by the contractor.

e) The installation, or part of the installation, shall only be deemed handed over when completed, tested and fully commissioned and then signed off by the Engineer

15 WORKMANSHIP AND INSTALLATION

15.1 PIPING GENERAL

15.1.1 Materials and workmanship shall be the best of their respective kinds. Only new and undamaged materials shall be used in the Works. Materials to be permanently installed into the works shall not be used for any temporary purposes on site. Work shall be to the approval of the Engineer and shall be executed in accordance with the relevant manufacturer's written recommendations and instructions.

15.1.2 Drawings are generally diagrammatic and indicative of work to be installed. Run and arrangements of piping shall be approximately as indicated, subject to modifications as required to suit conditions at building, to avoid interference with work of other trades, or for proper, convenience and accessible location of all parts of piping systems. Due to small scale of drawings, all required offsets, fittings, valves, traps, drains, etc., may not be indicated. Refer to and carefully check Architectural, Structural, Electrical, Wet Services and Mechanical drawings and details, noting locations where walls, partitions, ceilings, beams, columns and other surfaces are furred, location of beam cuts, location of pipe shafts and conflicts with work of other trades and arrange work accordingly, providing all offsets, fittings, valves, traps, drains, etc., required to meet such conditions.

15.1.3 Run piping in wall chases, recesses, pipe shafts and hung ceilings where same are provided. All pipe work in walls shall be protected as per SANS 10252-1. No piping shall run in floor fill unless indicated or specifically approved. Exterior utilities are diagrammatic and exact location and invert elevations shall be as indicated or required to meet existing conditions. Installing piping under buildings is to be avoided or were instructed as high as possible and in a sheath. Do not permanently close up, fur in or cover piping before examination, testing and approval by the Engineer.

15.1.4 Run piping as level, straight and direct as possible, in general forming right angles with or parallel to walls or other piping and neatly spaced with risers erected plumb and true. Install piping so that there is clearance of at least 25mm between finished coverings (fitting hubs on uncovered piping) of piping and also between finished coverings or fitting hubs and adjoining work. Hang piping at or in ceiling from construction above, as close as possible to bottom of slabs, beams, etc., maintaining maximum headroom at all times. Obtain from Engineer approved ceiling heights and install work above this height.

15.1.5 No piping shall be run in elevator machine rooms (except where special ducts are provided), telephone rooms containing telephone equipment, relays and terminal strips, and electric rooms and closets containing exclusively equipment such as transformers, switchgear, motor control centres, panel boards, or similar items of equipment, and in emergency generator room. Elsewhere, no piping shall be run within 1,75m laterally of such electrical apparatus as motor control panels, switchboards and electric motors, except for branch piping connecting to equipment.

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

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

15.1.8 Exposed Chrome Plated (CP) piping about fixtures and equipment shall not show tool marks or more than one thread at fittings. Fittings, valves and hangers on CP piping shall have CP finish.

15.1.9 Use reducing fittings for changes in pipe sizes. Use no bushings except with special permission from the Engineer.

15.1.10 Provide unions or flanges in connections to risers, by-passes and equipment. Refer to specification herein and in the Engineers standard drawings for reference.

15.1.11 All vertical pipes must be securely fixed with brackets and supports of an approved type securely fixed into the wall, not more than 40mm from the wall. These fixings must be strictly adhered to. The pipe hangers for both drainage, water supply (hot, cold, grey, treated) shall be rubber lined to keep building noise to a minimum.

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

15.1.13 Hot water pipes shall be lagged to an R-1 and R-1.5 rating as per SANS 10252-1 with a zero ozone depletion (ODP) count for the insulation and manufacturing process. Pipe chasing shall be covered with a mesh to bond the rendering or plaster work.

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

15.2 EXPANSION SWINGS

15.2.1 Make adequate provision for proper expansion and contraction of piping and for piping passing through building expansion joints. At connections of branches to water mains and risers and at connections to heaters, tanks, pumps, coolers and other equipment, provide sufficient number of elbow swings to allow for proper expansion and contraction of piping. Provide adequate elbow swings, or expansion loops, or approved type expansion joints, wherever indicated or required to allow for proper expansion and contraction of mains and risers.

15.2.2 The pipe expansion of the plastic pipes is to be compensated and allowed for in accordance with the manufacturer's specifications.

15.2.3 Where flanged "Bellows" type expansion compensators are specified they are to be installed as detailed and in accordance with the manufacturer's recommendations.

15.2.4 Should these compensators be specified for installation in wood truss roof structures the Contractor is to report to the engineer, who will provide details of the location and installation requirements.

15.3 SLEEVES

15.3.1 Provide sleeves large enough to accommodate pipe and its covering passing entirely through floors, ceiling, walls, or partitions. Install fire collars through firewalls or slabs in accordance with engineer's requirements.

15.3.2 Provide cast iron or steel pipe sleeves for pipes passing through exterior walls, footings or beams or through floors (interior) or machinery rooms containing Plumbing, Heating, Ventilation, or Air Conditioning equipment, and here extending 50mm above finished floor. Provide sleeves through exterior walls below grade and floors specified above with one continuous sheath, no joints. At exterior walls, make pipe watertight on both sides of the wall.

15.3.3 Except as otherwise noted, provide PPR or HDPE class 6 sleeves for all pipes passing through roof slabs, interior floors, ceilings, walls or partitions, unless framed opening is provided in general construction.

15.4 ESCUTCHEONS

15.4.1 Unless otherwise noted, provide exposed pipes, both bare and covered with approved type CP escutcheons where they pass through walls, partitions, floors, or ceilings; held in place by set screws or on covered pipes by internal spring tension. In toilet rooms, at tile walls and in connections with chromium plated piping, escutcheons shall have chromium plated finish.

15.4.2 Where sleeves, hubs or fittings project slightly from wall, partition, floor or ceiling, provide special deep type escutcheons to cover each case.

15.5 OFFSETS

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

16 MATERIALS

16.1 GENERAL

16.1.1 All materials, etc. specified herein under a trade name or generic description, catalogue number or reference shall be either exactly as described or, in the opinion of the Engineer, of equal quality, specification and mass in all respects to those described. Written approval shall be obtained for the use of any alternative to the specification before the submission of tenders; otherwise it will be assumed that the specified materials, etc. have been allowed for in the tender.

16.1.2 Materials shall be new, unused, best of their respective kinds and free from defects.

16.1.3 All materials shall comply with the relevant SABS standard or regulation as laid down in the NBR and National Compulsory Water Services Act: 1997.

16.1.4 For Chromium Plating, materials shall be cleaned and polished before plating and plated heavily, thoroughly and evenly and guaranteed not to strip or peel. Steel or cast iron shall be firstly copper plated. Brass, copper and copper plating shall be nickel plated before chromium plating. Finish shall be polished or satin as further specified.

16.2 COPPER PIPE INSTALLATIONS

16.2.1 The installation of copper piping systems shall be done in accordance with the manufacturer's Code of Practice and all relevant codes, standards and regulations.

16.2.2 Copper pipes shall only be installed downstream of galvanized mild steel pipes when applicable.

16.2.3 Where dissimilar metals are joined, di-electric or isolating couplings shall be used. This is not required where copper and brass de-zincified alloys join.

16.2.4 Copper pipes shall be of the hard drawn type Class as per the local bye-laws according to SANS 460 and shall be joined by means of capillary soldered type fittings. Compression fittings should not be used unless specifically authorised by the engineer and only on Class 2 or 3 piping.

16.2.5 The soldering flux to be used shall be water based and easily flushed out, withstand temperatures above 240°C and shall contain no ammonia. The flux shall be non-toxic when dissolved in water.

16.2.6 The solder to be used shall be in accordance with SABS and shall consist of a material containing 97% tin and 3% copper. Solders containing lead, resin core and acid core shall not be used.

16.2.7 The heat source to be used shall be propane gas with induction air, at a temperature not higher than 240°C. The pipe ends and fittings shall be cleaned and wiped with an approved solder flux, before soldering. The pipe and fittings shall then be fitted together and heated to the correct temperature before the solder is applied. Care must be taken not to add too much or too little solder to the joint. Immediately after setting of the solder the joint shall be wiped clean with a wet cloth. Pipes shall be washed out as soon as possible after jointing and all traces of flux shall be removed.

16.2.8 All bronze or brass equipment and fittings shall be of the de-zincified type.

16.2.9 Pipes chased or built into walls or floor shall be wrapped with 2 layers of building paper or similar approved material. Hot and cold water pipes running next to each other shall have a minimum clearance of 50mm.

16.2.10 Equipment fixed to copper pipe outlets, where the pipes are mounted surface or built into walls, shall be done by means of copper wall plate fittings on the copper pipe, properly secured to the structure to prevent structural damage to soldered joints.

16.2.11 Pipe hangers and brackets shall be of copper, copper alloy or non-conductive materials. No piece of copper pipe shall touch any other conductive surface. Brackets shall be designed to structurally support and fix the pipe system, and shall allow enough clearance from walls, soffits, etc. to insulate hot water pipes and maintain equipment. The pipe hangers shall be rubber lined to keep building noise to a minimum.

PIPE DIAMETER (mm)	HORIZONTAL (metre)	VERTICAL (metre)
15	1.3	1.9
22 & 28	1.9	2.5
35 & 42	2.5	2.8
54	2.5	3.9
67 - 108	2.8	3.0

16.2.12 All copper pipes open to structural damage shall be protected by steel sleeves or a structurally designed cover.

16.2.13 Where flanged fittings are used cadmium plated bolts, nuts and spring washers shall be used to join these flanges.

16.2.14 Pipes shall be installed in such a manner as to prevent air locks. A minimum rise of 1:250 shall be maintained to high points which shall be fitted with suitable air release valves.

16.2.15 Shut-off valves shall be installed on all branch pipes, connections to equipment, sanitary ware and other fittings as indicated by the engineer.

16.2.16 All pipes shall be marked in accordance with SANS 10140 or as specified by the engineer.

16.2.17 All pipework and fittings shall be pressure tested, disinfected and sterilised as per SANS 10252-1.

16.3 GALVANIZED STEEL PIPE INSTALLATIONS

16.3.1 All galvanized steel pipes shall, unless otherwise specified, be medium gauge mild steel screwed and socketed pipes to SANS 62 and shall be normalised and marked as such by the manufacturer. Pipes shall be hot dipped galvanized to the latest SANS specification.

16.3.2 All fittings shall be malleable cast iron fittings and galvanized to the latest SANS specification.

16.3.3 All 100 diameter and larger pipes shall be joined with Class 16 flanged couplings to SABS 1123/1600. The bolts, nuts and washers to be used on these joints shall be cadmium plated.

16.3.4 In pipe ducts and elsewhere pipes shall be fixed onto walls, soffits etc. with approved type of supports, holder bats, clamps etc. Brackets shall be designed to structurally support and fix the pipe system and shall have enough clearance from walls, soffits etc. to insulate hot water pipes and maintain equipment. The pipe hangers shall be rubber lined to keep building noise to a minimum.

16.3.5 Pipes shall be supported according to the manufacturer's specifications at the following maximum intervals:

NORMAL SIZE (MM)	HORIZONTAL (METRE)	VERTICAL (METRE)
15Ø to 20Ø	1.2 m	1.8 m
32Ø to 40Ø	1.8 m	2.5 m
50Ø to 150Ø	2.5 m	3.0 m

16.3.6 Pipes shall be installed in such a manner as to prevent airlocks. A minimum rise of 1:250 shall be maintained to high points which shall be fitted with suitable air release valves.

16.3.7 All pipes shall be marked according to SABS 10140 or as specified by the Engineer. All exposed pipes shall be painted to the required colour as specified by the architect.

16.3.8 Make joints in screwed piping with hemp and "Stag" jointing compound approved by the engineer and sparingly used with good quality hemp. For pipes larger than 80mmØ a jointing compound such as Eperdermix 32 shall be used. Hemp and jointing compound shall be used sparingly and applied to the male thread only.

16.3.9 Any pipe buried shall have at least 900mm cover and be coated and wrapped to SABS 1117 and tested in the presence of the engineer.

16.3.10 All pipework and fittings shall be pressure tested, disinfected and sterilised as per SANS 10252-1.

16.3.11 Valves shall be installed on all branch pipes and ball-o-stop valves on all connectors to basin pillar cocks, sink mixers, cistern type WCs and other fittings, as indicated by the engineer.

16.3.12 Approved type expansion bellows shall be installed where required for expansion and contraction to prevent excessive stain on fittings and pipe joints.

16.3.13 All wall plate elbows shall be of the solid brass type usually used for copper pipe installations. All wall plate elbow installations will be inspected and approved by the manufacturer in conjunction with the Engineer.

16.4 POLYPROPYLENE RANDOM COPOLYMER PIPE INSTALLATIONS TYPE COPRAX OR APPROVED EQUAL.

16.4.1 Unless otherwise specified all pipework shall be in accordance with SANS 15874 Parts 1, 2, 3, and 5 of 2004. "**Plastics piping systems for hot and cold water installations – Polypropylene (PP)** as well as being Jaswic registered.

16.4.2 All Bends, Tees, unions, reducers, and other fittings are to be of the welded type, with mechanical joints to other materials only.

16.4.3 All welded joints shall be conducted in accordance with the specifications and directions of the pipe manufacturer. All welded joints shall be inspected and approved by the manufacturer's representative in conjunction with the Engineer.

16.4.4 The Engineer reserves the right to have 10% of all welded joints chosen at random, to be cut out, inspected and tested. Should any of the welded joints be unsatisfactory or fail the test, the Engineer may require further joints to be cut out at random for further inspections and tests.

16.4.5 Should further failures occur or be found, the complete installation will be stopped and all the welded joints shall be replaced to the satisfaction of the Engineer.

16.4.6 Any damages incurred due to the above, will be for the account of the plumbing contractor.

16.4.7 All wall plate elbows shall be of the solid brass type usually used for Copper pipe installations. All wall plate elbow installations will be inspected and approved by the manufacturer in conjunction with the Engineer.

16.4.8 Pipe hangers and supports.

16.4.9 The pipe hangers and supports shall be installed in accordance with the manufacturer's specifications, requirements and approval. Pipe movement, expansion and contraction must be taken into consideration. Careful calculations in this regard must be done in conjunction with the manufacturer and in accordance with the manufacturer's specifications and approval.

16.4.10 The complete pipe installation shall be marked in accordance with SABS 10140 or as specified by the Engineer.

16.4.11 All wall plate elbows shall be of the solid brass type usually used for copper pipe installations. All wall plate elbow installations will be inspected and approved by the manufacturer in conjunction with the Engineer.

MULTI LAYERED PIPE (MLP) PIPING (PE-RT II/AL/PE-RT II) OR APPROVED EQUAL.

16.4.12 Unless otherwise specified all pipework shall be in accordance with SANS 22391-2i2008 and SANS21003 Parts 1,2,3,5. "Multilayer piping systems PERT for hot and cold water installations inside buildings" as well as being Jaswic registered.

16.4.13 Three layer PE-RT II/AL/PE-RT II piping

16.5 PIPE HANGERS AND SUPPORTS (FOR ALL WATER SUPPLY PIPING)

16.5.1 The pipe hangers and supports shall be installed in accordance with the manufacturer's specifications, requirements and approval. All pipe hangers shall be installed with a rubber lining around the full circumference of the piping keep building noise to a minimum. Sikla stabil c/w rubber lining or equal and approved by the wet services engineer shall be installed.

16.5.2 Pipe movement, expansion and contraction must be taken into consideration. Careful calculations in this regard must be done in conjunction with the manufacturer and in accordance with the manufacturer's specifications and approval.

16.5.3 The complete pipe installation shall be marked in accordance with SABS 10140 or as specified by the Engineer.

16.6 UPVC UNDERGROUND PIPE INSTALLATIONS

16.6.1 Unless otherwise specified all underground pipe work >50mmØ shall be Class 16 uPVC to SABS 966 with rubber ring type joints.

16.6.2 All bends shall be uPVC Class 16 type fittings with rubber ring joints.

16.6.3 All other fittings such as T-pieces, reducers, flanges etc shall be bitumen dipped cast iron rubber ring jointed fittings to the latest SANS specification.

16.6.4 No solvent weld type fittings will be allowed.

16.6.5 All cast iron fittings shall be coated and wrapped to the latest SANS specification.

16.6.6 All pipes shall be laid on a 100mm sand bedding cradle and covered with 300mm and before backfilling.

16.6.7 All backfilling shall be to the engineer's specification and approval.

16.6.8 Pipe trenching and bedding:

AREA	MINIMUM COVER	BEDDING TYPE	MAIN FILL
Vehicle Traffic	1100	Flexible pipe bedding as per SABS 1200 LB	Soilcrete
Under surface bed	600		Soilcrete
Other areas	900		90% MOD AASHTO

16.6.9 All thrust blocks shall be cast between the pipe and the undisturbed trench material.

16.6.10 No concrete shall come into direct contact with the uPVC pipe. At the thrust blocks the end shall be wrapped with a "Densopol 80 HT Tape" or similar approved.

16.6.11 All pipes shall be laid with at least 900mm cover to the top of the pipe.

16.6.12 Marker blocks shall be installed at all tees or changes of directions.

16.6.13 HDPE pipe connections to uPVC pipes up to 50mmØ can be done by means of SG Iron manufactured saddles with the appropriate gaskets and cadmium plated bolts and nuts.

16.6.14 All pipe crossings under traffic areas shall be backfilled with soilcrete and compacted as specified.

16.6.15 All pipe work shall be pressure tested with all joints uncovered, to the satisfaction of the Engineer.

16.6.16 Suitably sized air release valve built into valve chambers shall be installed at all high points of the pipe line.

16.7 HDPE PIPE INSTALLATIONS

16.7.1 Underground Pressure Pipework

- Unless otherwise specified all underground pipe work >50mmØ shall be Class 16 Type 4 HDPe pipe to SANS 4427.
- All fittings shall be flanged or butt welded as per SANS 10269.
- All pipes shall be laid on a 100mm sand bedding cradle and covered with 300mm of sand or selected material.
- All backfilling shall be to the engineer's specification and approval.
- Pipe trenching and bedding:

AREA	MINIMUM COVER	BEDDING TYPE	MAIN FILL
Vehicle Traffic	1100	Flexible pipe bedding as per SANS 2001	Soilcrete
Under surface bed	600		Soilcrete
Other areas	900		90% MOD AASHTO

- No concrete shall come into direct contact with the HDPe pipe. At these points the fittings shall be wrapped with "Densopol 80 HT Tape" or similar approved.
- Marker blocks shall be installed at all tees or changes of directions.
- All pipe crossings under traffic areas shall be backfilled with soilcrete and compacted as specified.
- All pipework shall be pressure tested with all joints uncovered to the satisfaction of the engineer.
- Suitably sized air release valves built into valve chambers shall be installed at all high points of the pipe line.

16.7.2 Drainage Pipe work

- HDPe drainage pipe work shall be SANS 8770 & 8772 or equal system utilising standard drainage fittings.
- The following jointing methods are acceptable for the pipe system depending on application:
  - Butt welding for general pipe joints
  - Electro-weld sleeve coupling in areas of limited access
  - Ring seal socket for individual prefabricated sections only where a change in material applies, vertically installed
  - Expansion socket where movement is necessary
  - Screw threaded joint for detachable connections
  - Flange connections for connection to equipment

- Joints shall be made with a smooth interior to ensure there is no restriction flow inside the pipes. Only long radius bends shall be used unless otherwise approved in writing by the Engineer. Therefore 2 x 45 degree bends shall be used and not 90 degree bends.
- Joints shall be made with a smooth interior to ensure there is no restriction flow inside the pipes.

- The pipe hangers and supports shall be installed in accordance with the manufacturer's specifications, requirements and approval. All pipe hangers shall be installed with a rubber lining around the full circumference of the piping keep building noise to a minimum. Sikla stabil c/w rubber lining or equal and approved by the wet services engineer shall be installed.

16.8 SUPERCAST CAST IRON PIPE AND FITTINGS

16.8.1 Supercast iron pipes can be used for underground and above ground installations. Plain ended spun cast iron pipes and fittings manufactured from 150 Grade A grey iron in accordance with SABS 1034 shall be used. Fittings and pipes to be free of pinholes, blemishers, flash and foundry sand and to have a smooth bore. All pipes and fittings to be sandblasted and coated on the inside and outside by submersion in a corrosion inhibited oxide primer or bitumen paint.

16.8.2 The pipes and fittings shall be joined by means of stainless steel neoprene couplings as supplied by the manufacturer of the pipe system. The coupling shall be installed according to the manufacturer's specification and be tightened with a torque wrench to a torque of 6.8 Nm.

16.8.3 Where cast iron stub stack overflow gullies are used with pipe materials such as PVC, a rubber O-ring shall be used to fit over the PVC pipe into the cast iron fittings. The joint shall be grouted up afterwards.

16.8.4 Above ground piping shall be bracketed with properly sized and designed brackets according to the manufacturer's specification at correct intervals.

16.9 UPVC SOIL AND WASTE PIPES AND FITTINGS

16.9.1 Where specified uPVC soil, vent and waste pipe systems can be used for underground and above ground drainage installations. This piping shall conform in all respects to SANS 791 for underground systems and to SANS 967 for above ground system.

16.9.2 All underground and soil pipe above ground pipes and fittings shall be joined by means of rubber ring seal couplings and fittings in accordance with the manufacturer's specification. All waste and vent pipe and fittings shall be joined by means of solvent weld fittings and couplings. The solvent weld glue to be used shall be as specified by the pipe manufacturer allowing for thermal contraction and expansion.

16.10 STRUCTURAL WALL UPVC PIPES AND FITTINGS

16.10.1 Where specified a structural wall uPVC drainage pipe can be used for underground drainage systems. This piping system shall be used with standard underground uPVC pipe fittings as specified under item 3,4, equipped with rubber ring joints. The pipe shall be equipped with z-lock type rubber ring joints.

16.11 ALL PIPE WORK SYSTEMS SPECIFIED SHALL COMPLY WITH THE RELEVANT SABS STANDARD.

17 VALVES FOR DOMESTIC WATER INSTALLATIONS

17.1 GATE VALVES UNDERGROUND IN VALVE CHAMBERS TO CONNECT TO UPVC PIPING (65 NB AND LARGER)

17.1.1 Gate valves to be equipped with non-rising spindle, spherical graphite iron body to SABS 936 Grade 42, cast iron nitrile butadiene rubber covered gate, stainless steel spindle, nitrile butadiene rubber O-rings and seals, cast iron bonnet and gunmetal thrust collar to BS 1400 LG2.

17.1.2 The valve shall conform to SABS 664 and/or 665, and shall be capable of withstanding a working pressure of 1600 kPa.

The valve shall be fitted with a square key spindle top to close the valve in a clockwise direction and socket ends to SABS 665 to fit uPVC Class 16 pipe and installed to detail.

17.2 GATE VALVES UNDERGROUND IN VALVE CHAMBER TO CONNECT TO HDPE PIPING

17.2.1 The gate valves shall be of the de-zincified brass type with brass gate, brass body, non-rising spindle and BSO threaded socket ends. The valve shall conform to SABS 776/1965 Class 125. The valve shall be able to withstand a working pressure of 1600 kPa. The valve shall be fitted with a hand wheel on an extended spindle shaft of +/- 700mm to close in a clockwise direction and installed to detail.

17.3 GATE VALVES ABOVE GROUND FOR TEMPERATURE UP TO 40°C TO CONNECT TO STEEL PIPING (65 NB AND LARGER)

17.3.1 Gate valves to be equipped with non-rising spindle, spherical graphite iron body to ABS 936 Grade 42, cast iron nitrile butadiene rubber covered gate, stainless steel spindle, nitrile butadiene rubber o-rings and seals, cast iron bonnet and gunmetal thrust collar to BS 1400 LG2.

17.3.2 The valve shall conform to SABS 664 and/or 665, and shall be capable of withstanding a working pressure of 1600 kPa.

17.3.3 The valves shall be fitted with flanged ends to SABS 1123/1600 (1977), hand wheel to close the valve in a clockwise direction and installed in an upright position or sideways to a maximum 90° from upright.

17.4 GATE VALVES ABOVE GROUND FOR TEMPERATURES ABOVE 40°C TO CONNECT TO STEEL PIPING (65 NB AND LARGER)

17.4.1 Gate valve shall be equipped with non-rising spindle, spherical graphite iron body to SABS 963 Grade 42, cast iron gate, gunmetal seat and gate rings, high tensile bronze spindle, cast iron bonnet and gunmetal thrust collar to BS 1400 LG2.

17.4.2 The valve shall conform to SABS 665 and shall be capable of withstanding a working pressure of 1600kPa and a temperature of 90°.

17.4.3 The valve shall be fitted with flanged ends to SABS 1123/1600 (1977), hand wheel to close the valve in a clockwise direction and installed in an upright position or sideways to a maximum 90° from upright.

17.5 GATE VALVES ABOVE GROUND TO FIT TO COPPER PIPES (65 NB AND LARGER)

17.5.1 Gate valves shall be equipped with non-rising spindle, gunmetal bronze or de-zincified brass body, gunmetal or de-zincified brass gate, graphite asbestos packing in the gland.

17.5.2 The valve shall be fitted with a hand wheel to close in a clockwise direction and installed in an upright position or sideways to maximum 90° from upright.

17.5.3 The valve shall be equipped with flanges to SANS 1123/1600, hand wheel to close the valve in a clockwise direction and installed in an upright position or sideways to a maximum 90° from upright.

17.6 GATE VALVES ABOVE GROUND FOR TEMPERATURES UP TO 100°C (UP TO 50 NB)

17.6.1 The gate valves shall be of the de-zincified brass type with brass gate, brass body, non-rising spindle and BSP threaded socket ends. The valve shall conform to SANS 776 Class 125.

17.6.2 The valve shall be able to withstand a working pressure of 1600 kPa.

17.6.3 The valve shall be equipped with a hand wheel to close in a clockwise direction.

17.6.4 The valve shall be installed in an upright position or sideways to a maximum of 90° from upright and shall be so placed with other fittings to be removable without cutting the pipe work.

17.7 LEVER ARCH BALL VALVES (BALL-O-STOP VALVES), (15MMØ – 50MMØ)

17.7.1 Ball-o-stop valve shall be a full-way ball cock type with BSP threaded ends. These valves shall conform to SANS 1056 Part 3 and shall be rated for a test pressure of 900 kPa. Valve shall be chrome finished when exposed.

17.8 BUTTERFLY VALVES (65 NB AND LARGER FOR PLANTROOMS)

17.8.1 The butterfly valves shall be of the de-zincified brass type with a stainless steel disk and EPDM seats unless otherwise specified by the Engineer. The valve shall conform to SANS 1849, and shall be capable of withstanding a working pressure of 1600 kPa.

17.8.2 The valves shall be fitted with flanged ends to SABS 1123/1600 (1977).

17.8.3 Where the butterfly valve is classified as the scour valve connected to the domestic pump set a stainless steel body butterfly valve shall be used with stainless steel seats.

17.9 ANGLE REGULATING VALVES

17.9.1 Angle regulating valve shall be a 15mmØ chromium plated angle regulating valve with a 350mm chromium plated copper tube and cap nuts where required or SABS approved braided connector as specified by the Engineer.

17.10 VALVE TAG AND CHARTS

17.10.1 Provide on all valves and controls, identifying numbered metal tags, including letter to indicate system, fastened by heavy brass hooks or chain.

17.10.2 Tags: Not less than 50mm square, 1.25mm thick, aluminium with stamped numbers and letters filled in with black paint.

17.10.3 Provide separate diagrammatic charts showing essential features of each system with all valves and control lettered and numbered to correspond to designation on metal tags. Also furnish list of all valves and controls giving location and function.

17.10.4 Charts and lists: Type, size and character as approved. Mount in glazed metal frames permanently fastened in locations as approved by the consulting engineer.

17.11. ALL VALVES INSTALLED IN ANY MATERIAL TYPE PIPE SYSTEM SHALL BE COMPATIBLE IN THE TERMS OF CHEMICAL TRANSFER OF ELECTRONS.

18 STRAINERS

18.1 STRAINERS FOR CONNECTION TO STEEL OR UPVC PIPES (65 NB AND LARGER)

18.1 This strainer shall be of the Y-type with cast iron body, stainless steel or bronze strainer element and shall be equipped with flanged ends to SABS 1123/1600 (1977). The orifice sizes of the strainer element shall be maximum 1mmØ and be removable without dismantling of pipe work. The strainer shall be suitable for a temperature of up to 90°C at a 1000 kPa pressure rating and installed with the element facing downwards or a maximum of 45° sideways.

18.2 STRAINERS FOR CONNECTION TO COPPER PIPES (65 NB AND LARGER)

18.2.1 This strainer shall be of the Y-type with bronze or dezincified brass body, stainless steel element and must be equipped with flanged ends to SABS 1123/1600 (1977). The hole sizes of the strainer element shall be maximum 1mm in diameter. The strainer element shall be removable without dismantling of pipe work. The strainer shall be suitable for a temperature of up to 90°C at a 1000 kPa pressure rating and installed with the element facing downwards or a maximum of 45° sideways.

18.3 STRAINERS FOR CONNECTION TO STEEL AND COPPER PIPES (UP TO 50 NB)

18.3.1 The strainers shall be of the Y-type with bronze or dezincified brass body, stainless steel strainer element and must be equipped with BSP threaded socket ends. The hole sizes of the strainer element shall be maximum 0.8mm in diameter. The strainer shall be suitable for a temperature of up to 90°C at a 1000 kPa pressure rating and installed with the element facing downwards or a maximum of 45° sideways.

19 NON-RETURN VALVES

19.1 NON-RETURN VALVES FOR COLD WATER (65 NB AND LARGER)

19.1.1 The non-return valve shall be of the spring loaded dual flap plate type fitted between two flanges. (Wafer).

19.1.2 The non-return valve shall be equipped with a cast iron body, aluminium bronze plates, stainless steel springs and neoprene seals on the plates. The valves shall be suitable for a working pressure of 1000 kPa.

19.2 NON-RETURN VALVES FOR HOT WATER (UP TO 100Ø) AND COLD WATER (UP TO 50 NB)

19.2.1 The non-return valve shall be of the spring loaded piston type, with bronze or dezincified brass body, stainless steel spring and bronze disc with neoprene seal fitted with BSP threaded socket ends. The valve shall be suitable for a working pressure of 1000 kPa and a temperature of up to 90°C. All valves shall be installed so as to be removable without extensive pipe work removal.

20 AIR RELEASE VALVES AND VACUUM BREAKERS

20.1 DOUBLE ORIFICE DOUBLE ACTING AIR RELEASE VALVES WITH SIZES FROM 50 NB TO 200 NB

20.1.1 The air release valve shall be fitted with small and large orifice. The air release valve shall be fitted with a cast iron body, stainless steel or fibre glass balls, integral shut off valve and flanged ends to SANS 1123/1600/ 198.

20.1.2 The valve shall be suitable for maximum pressure of 1.5 times working pressure &.

20.2 SINGLE ORIFICE AIR RELEASE VALVES FOR MAIN WATER LINES WITH SIZES FROM 25 NB TO 50 NB

20.2.1 The air release valve shall be fitted with a small orifice, cast iron body, fibre glass or stainless steel ball float and BSP threaded inlet.

20.2.2 When the valve is installed a shut off valve shall be installed on the inlet side.

20.2.3 The valve shall be suitable for maximum pressure of 900kPa.

20.3 SINGLE ORIFICE DOUBLE PURPOSE AIR RELEASE VALVES FOR DOMESTIC WATER LINES UP TO 15 NB

20.3.1 The air release valves shall be fitted with a stainless steel float, brass or cast steel body with an integral shut off valve fitted.

20.3.2 The valve shall be capable to withstand a working pressure of 600kPa at 110°C.

20.4 VACUUM BREAKER UP TO 40MMØ

20.4.1 The vacuum breaker shall be fitted with neoprene seal, spring loaded disc in a de-zincified brass, bronze body or polymer that meets the requirements of SANS 198. The valve shall seal water tight and shall be designed to SANS 198.

21 PRESSURE REDUCING VALVES

21.1 COMBINATION PRESSURE REDUCING STATIONS

21.1.1 Where a high peak flow can occur as well as a small flow and the small flow is out of the range of the large pressure reducing valve, a small PRV shall be installed in parallel with the large PRV. The two PRVs in parallel shall be set according to the manufacturer's specification.

21.2 LARGE PRESSURE REDUCING VALVES (65 NB AND LARGER)

21.2.1 The pressure reducing valve shall be equipped with a cast iron body, neoprene – nylon reinforced diaphragm, bronze seal disc washer, stainless steel shaft and flanged ends. The valve shall be pilot operated and shall be designed to handle high flows at a minimum head loss.

21.2.2 The valve must be adjustable to handle a wide range of incoming pressure at a constant downstream pressure.

21.2.3 The valve shall be equipped with flanged ends to SANS 1123/1600 and pressure guage(s) as shown on the engineers standard drawings.

21.3 SMALL PRESSURE REDUCING VALVES (15 NB – 50 NB)

21.3.1 The pressure reducing valve shall be equipped with brass body, balanced single seat and integral strainer. The valve shall be able to handle a wide range of incoming pressure while the downstream pressure stays constant with maximum inlet pressure of 600kPa and a maximum water temperature of 40°C.

21.3.2 The valve shall be equipped with BSP male threaded union couplings and pressure guage(s) as shown on the engineers standard drawings.

21.4 ALL PRVS SHALL COMPLY WITH SANS 198.

22 WATER METERS

22.1 COMBINATION WATER METERS

22.1.1 Where high peak flow as well as a small flow can occur, and the small flow is out of the registration range of large water meter, a small water meter shall be installed in parallel with the large water meter to cater for the small flows with integral automatic changeover valves. These valves shall be designed to have a minimum pressure drop at operating point.

22.2 WATER METERS (50 NB AND LARGER)

22.2.1 These water meters shall be of the dry tube with all gears and transmission and roller counters in a dry head, and shall be equipped with flanged ends to SABS 1123, cast iron body with high quality corrosion proof coating. The meter must be protected from magnetic fields and must be sealed to prevent tampering with adjustments. The meter must be able to work up a pressure of 1600 kPa under a maximum water temperature of 40°C. The scale of meter must be in a m^3 and equipped with needle indicators reading in litres. Accuracy of meter to be not less than 98%.

22.2.2 The meters shall be installed with leading and trailing lengths of pipes to the manufacturer's specification.

22.3 WATER METERS (UP TO 50 NB)

22.3.1 The meter shall be of the volumetric rotary piston type with brass body equipped with union couplers. The meter shall have an accuracy of not less than 09%. The meter must be able to operate up to a water pressure of 1000 kPa at a water temperature of 40°C.

22.3.2 The meters shall be installed with leading and trailing lengths of pipes to the manufacturer's specifications.

22.4 All water meters shall be of a pulse type & supplied with read switches.

23 ADJUSTABLE BALANCING VALVES

23.1 Adjustable balancing valves shall be supplied and installed as indicated on the appropriate drawings. A portable differential pressure metre shall be used, with all the necessary pipes, shut-off valves and air release valves to set the balancing valves. A graph chart shall be supplied to indicate the flow units against the valve adjustment and as the pressure differential over the valve.

23.2 The pressure gauge shall be calibrated according to the current accepted SI units.

23.3 On completion of the project the chart shall be handed to the maintenance manager.

23.4 The calibrated adjustable balancing valve shall be of the angle valve type equipped with bronze valve body, bronze disc, internal seals with BSP threaded ends. The valve shall be fitted with stop cock connection ends on inlet and outlet onto which the differential pressure gauge can be coupled to. The valve shall be equipped with an indicator on the valve handle to show the position of the valve opening. The valve shall be suitable for operating at a temperature of 90°C against a pressure of 1000 kPa.

23.5 The balancing valve shall further be installed with union couplings for diameters smaller than 50mm. The balancing valve shall be installed with flanged ends to SANS 1123/1600 for diameters larger than 50mm.

24 DRAINAGE SYSTEMS

24.1 GENERAL REQUIREMENTS

24.1.1 The complete sanitary drainage systems, including connections to main outfall sewer and drainage connections to plumbing fixtures, kitchen and other equipment requiring same shall be installed in accordance with requirements of the Authorities having jurisdiction and the National Building Regulations and Building Standards Act of 2010 as amended.

24.1.2 The Subcontractor shall arrange with the local authorities for all inspections and tests.

24.1.3 Before any part of a drainage system is permanently covered or otherwise rendered inaccessible it shall be inspected and approved by the local Authority and the Engineer.

24.1.4 All equipment, materials and labour necessary for inspection and testing as required shall be made available by the contractor.

24.1.5 All plumbing and drainage work shall be carried out under the direct supervision of a registered plumber and drain layer in terms of the requirements of the local authority and Act. A copy of the registration certificate of all persons carrying out or supervising such work shall be kept on site for inspection at all times. The contractor shall in addition be registered by the local authority.

24.2 DRAINS

24.2.1 All drains shall be laid in a straight line between points where changes of direction or gradient occur.

24.2.2 Where drains pass under any wall other than a free-standing wall such drain shall be cast iron pipe and shall be completely encased in concrete not less than 100mm thick measured at the hub.

24.2.3 Where any drain passes under a building or where indicated, the pipe shall be cast iron or HDPE and shall be encased in concrete, along its entire length, not less than 100mm thick measured at the hub. The drain shall be so arranged that it complies with SANS 10400-P or the Engineer's design to all junctions, bends and access eyes are readily accessible. This subject to a rational design.

24.2.4 Access to drains shall be in accordance with the requirements of the local authorities and Act.

24.2.5 Horizontal drainage piping shall be installed at a gradient not less than that indicated, unless approved by the Engineer.

24.2.6 All exposed drainage pipe and pipework within the building shall be in compliance with SANS 10252-2, SANS 52056 & regulation SANS 10400-P.

24.2.7 Underground piping external to the building shall, unless otherwise specified or indicated, be of a material that is SABS approved or equivalent.

24.2.8 Vent pipes shall be of the same.

24.2.9 Connections to fixtures shall be provided with approved type reseal traps and shall be installed to be readily accessible. De-mountable traps are required for access to the waste pipe.

24.2.10 All pipe laying is to be carried out in accordance with the procedure described in SANS 2001.

24.2.11 Laying is to commence at the points of junction with existing drains or at points of discharge.

24.2.12 Before each pipe is laid, it shall be examined to ensure that the bore is clean and any foreign material removed. Plug open ends and junctions, whenever work is suspended, to prevent the entrance of rubbish during construction.

24.2.13 Gulley traps are to be of the relevant material SABS standard; the whole set on and encased in cement concrete 1:3:6 carried up 150mm high as kerb, finished on exposed places with 20mm granolithic with angles rounded including excavation and casing.

24.2.14 Cleaning eye covers shall be cast iron A.B.C. covers and frames in high traffic areas & of the material of the general drain in light traffic areas, jointed to top of drain with Gaskin and T.O.K. strip grooved for and including stopper with raised letters "C.E", cast on same, bedding in tallow and screwed to frame with gunmetal set screws. The frame shall be encased in cement concrete 1:3:6 finished on top with untitled granolithic including excavation and casing.

24.2.15 Manholes, unless otherwise described, shall be constructed of precast reinforced concrete rings, with cast iron frames and covers, in accordance with the Drawings. The invert channels shall be smooth and semi-circular in shape conforming to the inside of the adjacent sewer section. Changes in direction of flow shall be made with a smooth curve of as large a radius as the size of the manhole will permit. Changes in size and grade of the channels shall be made gradually and evenly. The invert channels shall be formed directly in the concrete of the manhole base, or shall be built up with mortar, or shall be half tile laid in concrete, or shall be constructed by laying full section sewer pipe through the manhole and breaking out the top half after the surrounding concrete has hardened. The floor of the manhole outside the channels shall be smooth and shall slope toward the channels not less than one inch per foot (1:12) nor more than (1:6). Free drop inside the manholes shall not exceed 450mm measured from the invert of the inlet pipe to the top of the floor of the manhole outside the channels, and drop manholes shall be constructed whenever the free drop would otherwise be greater than 450mm.

24.2.16 All manholes to be with step rails fixed in the factory.

24.2.17 Where ground waters are suspected, a special concrete foundation & wall must be built against the buoyancy forces. The calculation will be issued by the Engineer.

24.3 VENTS

24.3.1 The drainage system shall, unless otherwise specified, be of the one pipe system and all necessary vents and anti-syphonage pipe shall be provided in accordance with the system requirements and in accordance with the relevant regulation & bye laws.

24.3.2 Vents extending above the roof level shall be located at least 1m away from any window, door or air intake opening, and shall be properly flashed.

24.3.3 Vent piping shall be run with long radius bends at changes in direction and shall be graded back towards the drain at 1:60 where possible.

24.3.4 When back to back W.C. arrangement is used, a 45° bend into the branch pipe or soil stack shall be deployed.

24.4 STAINLESS STEEL FLOOR TRAPS AND FLOOR CHANNELS

24.1.1 Stainless Steel Floor Traps

Stainless steel floor traps shall be installed where indicated on drawings for kitchen, abattoirs, ablutions & dining halls etc. The floor traps shall have minimum flow capacity of 2 fixture units or in an ablution area the accumulative fixture unit of the ablution. This can be achieved with several floor drains, if required.

24.1.2 Cast Iron Floor Traps

Cast iron floor traps shall be used where indicated on the drawings or specified. These units shall be manufactured out of cast iron as per detail supplied in the detail specification. The units shall be fitted with a water seal and a large sludge box and lid to be easily removable for maintenance purposes. The units shall be designed in such a manner as to provide access to the drainage system and to be used as a cleaning point. Flow rates apply as above.

24.5 SOILCRETE

24.5.1 Soilcrete shall be used in trench backfilling where specified indicated and where sewer trench bottoms are below the 45° angle of building foundations.

24.5.2 The compaction of the soilcrete shall be as follows:

- Soilcrete shall consist of an approved soil or gravel mixed in a concrete mixer with 5% of Portland demand (per volume) and only sufficient water to give a consistency that will permit the soilcrete to be placed. Concrete vibrators shall be used, so that all voids between the pipes and excavation sides and between culverts in the case of multi-barrel culverts are properly fitted. The height to which the soilcrete shall be filled, shall be determined by the engineer or be as shown on the drawings and any remaining backfill shall be carried out as described above using a granular material.

- The aggregate must consist of approved soil or gravel containing stones not bigger than 38mm and with a plasticity index not exceeding 10. Detrimental percentages of silt or clay must be avoided and the aggregate shall be obtained from an approved source.

24.6 TESTING OF THE DRAINAGE INSTALLATION

24.6.1 The contractor is to carry out all the tests on the drainage installation as required by the Local Authorities and shall receive their approval before requesting final payment and hand over of the installation.

24.6.2 The Engineer shall be informed when the tests are to be carried out in order that he may witness and approve these.

24.6.3 All drains are to be tested after backfill & part of the commissioning by camera & documented for the Commissioning Agent & Engineer.

24.7 DRAINAGE

24.7.1 All drainage shall comply with SANS 10400-P & SANS 10252-2.

25 DOMESTIC WATER SUPPLY SYSTEM

25.1 GENERAL

25.1.1 Provide complete domestic hot and cold water supply systems, including connection to supply authority, hot water heating equipment and required hot and cold water connection to plumbing fixtures, kitchen and other equipment requiring same all as indicated.

25.1.2 Run piping free of traps wherever possible, and grade and valve for complete control and drainage of system with drain cocks at low points and at base of risers.

25.1.3 Provide on main water branches to dishwashers, domestic washing machines and where noted, properly sized shock absorbers, if required.

25.2 PREVENTION OF WATER CONTAMINATION

25.2.1 Wherever possible, provide over-rim water supplies to plumbing fixtures and equipment. Provide necessary below-rim connections, water closet and urinal flush valves, hose bibs and hose connections with approved vacuum breakers and/or check valves as noted or required.

25.2.2 Kitchen or other equipment supplied under other divisions of works and/or by owner, and having below-rim water supply connections, which may arrive on the project, the Subcontractor shall inform the Engineer & provide missing vacuum breakers and/or check valves, or re-locate same to regulation or compulsory standard approved positions.

25.3 PIPE, FITTINGS AND CONNECTIONS

25.3.1 Unless otherwise noted the pipe work shall comply with SANS 10252-1. Connection to valves and fittings shall be by means of BSP adaptors male or female as required.

25.3.2 Exposed piping at plumbing fixtures shall be CP copper pipe with CP threaded cast brass fittings.

25.3.3 Make connections to equipment with flanges or unions and with threaded adaptors used for swing connections. Terminate noted plugged or capped connections in threaded plug or threaded nipple and cap as required, unless otherwise noted.

25.3.4 Provide insulating bushings, couplings, unions, or flanges where pipe accessories connects to the piping system. Provide insulating bushings, couplings, unions, or flanges where one material type piping connects to another type piping at the beginning to the location of the different equipment connections.

25.3.5 When copper pipe is built into walls, floors, etc. and when laid underground, the piping shall be wrapped for its entire built-in length with Denso tape or equal approved protective covering. Hot water pipes shall be R 1 rated lagged.

25.4 INSULATION

25.1.1 general

- The Subcontractor shall provide insulation as specified herein on all hot water pipes and hot water heaters as per SANS 10252-1 & SANS 10400 XA.
- Insulation material shall be free from substances, which in the event of a fire would generate appreciable quantities of smoke, noxious or toxic fumes. The Contractor shall provide a suitable storage area for all insulation on site prior to fitment. He will be liable for replacement of same due to damage, as determined by the Engineer, at his own expense.
- Insulation materials and finishes shall prevent rotting, mould, fungal growth and attack by vermin, be non-hygroscopic and in all respects to be suitable for continuous use throughout the applicable range of operating temperatures and within the environment indicated
- Insulation material and their finishes shall be free from any form of asbestos.
- The insulation material shall not contain CFC's and shall be ozone and ultraviolet resistant with an ODP value of ZERO
- The thermal resistance of the material shall not degenerate below the thermal resistance value quoted over the life span of the product.

25.1.2 Quality Assurance

- This is a performance specification that requires an equipment submittal. The Contractor is to provide written confirmation that all insulation materials installed are as per specification. The Contractor is also to provide manufacturer's data sheets for each insulation product.
- Prior to insulation being fitted, all pressure testing shall be satisfactorily completed. The Specialist Insulation Contractor is, however, allowed to start insulating before testing provided that all joints are uncovered and visible for inspection.
- The selection of an insulated material shall comply with the manufacturers operating limits for the insulation, including but not limited to criteria for temperature, humidity and compressive strength.
- The materials selected for insulation, vapour barrier and cladding shall be compatible and suitable for the type of application, and shall be galvanic neutral.
- Material selected shall have a median life expectancy of 20 years.
- Materials shall tightly fit the outer perimeter of the medium insulated.

25.1.3 Application

- The thickness shall comply as a minimum with the thickness stated in Tables A and B.
- Minimum thicknesses specified in Table A and B, is based on thermal conductivity. The specialist insulation supplier should ensure that the correct thickness/density of material is used to prevent damage during construction and squashing at pipe supports.
- Fixing of insulation shall allow for expansion of piping.
- Where specified thickness of insulation exceeds commercially available sizes, insulation shall be applied in two or more layers, with all joints staggered and with overlaps of minimum 50mm. Insulation layers shall be strapped and glued into position as per specification.
- All bends and T-pieces shall be cut in 45° mitre box to form a neat joint. All joints shall be glued together with a contact adhesive as specified or supplied by the manufacturer.
- Pipe sizes smaller than or equal to **80mmØ** shall have a minimum **R-Value of 1**.
- Pipe sizes larger than **80mmØ** shall have a minimum **R-Value of 1.5**.
- **Hot water plants shall have a minimum R-Value of 2.**
- Pre-formed pipe insulation sections shall be used with pipe systems where the maximum temperature is 80 °C. Where pipe systems that operate at temperatures higher than 80 °C are installed, pre-formed fibreglass sections shall be used with galvanised sheet metal muffs.
- Where applicable, Duct tape shall be used to seal jointing of the insulation, incorporated with plastic cable ties, in areas not exposed to the elements. The application shall be tight and secure enough to prevent damage over the duration of the lifespan.

Table A		COPPER HOT WATER PIPING INSULATION			
DIAMETER	Minimum R-value	MINIMUM THICKNESS/THERMAL CONDUCTIVITY			
	m²K/W	0.05-0.06	0.039-0.049	0.030-0.038	0.022-0.026
15-28mm	1	35	30	25	20
35-54mm	1	40	35	30	20
67-76mm	1	45	40	30	25
≥108mm	1.5	65	55	45	35

Table B		MEPLA HOT WATER PIPING INSULATION			
DIAMETER	Minimum R-value	MINIMUM THICKNESS/THERMAL CONDUCTIVITY			
	m²K/W	0.05-0.06	0.039-0.049	0.030-0.038	0.022-0.026
12-20mm	1	35	30	25	20
25-40mm	1	40	35	30	20
50-65mm	1	45	40	30	25

25.1.4 Cladding

- Where cladding is required in terms of this specification, the standard for inland environments shall be "galvanised sheet metal" and for marine environments, aluminium with stainless steel as the last preferred option.
- Exposed piping shall be provided with 0,56mm thick galvanised sheet metal cladding over the insulation material.
- Bends shall be clad with Lobster Back bends, also of 0,5mm thick galvanised sheet metal. Cladding shall be secured by stainless steel bands or non-ferrous pop rivets every 50mm.
- All hot water pipes in service tunnels, service corridors or where exposed to damage and/or weather shall be insulated with pre-formed fibreglass sections covered with galvanised sheet metal or Aluminium muffs in a water tight manner.
- Sheet metal muffs shall be installed with the joints overlapping a minimum of 30mm for <ø150mm pipes and 50mm for ≥ø150mm pipes and to prevent ingress of water.
- External cladding seams of piping must be installed in a position that ensures there is no water ingress via the seam, with the longitudinal overlap pointing downwards. The seam angle and overlap section must ensure efficient water runoff and all joints must be water tight
- The sheet metal muff shall be strapped with 10mm galvanised straps by means of a strapping tool with a minimum of 2 straps/section.
- All pipe bends, T-pieces etc. shall be insulated with at least 25mmØ fibreglass rope covered with a 12mm thick layer of self-setting fibre cement. A reinforcing gauze shall be wrapped over the fibre cement while wet and then painted with a mastic paint when dry.
- Cladding shall be painted as specified for pipes with the relevant code for the fluid/gas being transported as per SANS 1040-3.
- Protective coating equivalent to "Foster Sealfos Coating 30-36" or "Decadex Fire Check" shall be brush applied over the canvas. Coatings shall be applied in accordance with manufacturer's recommendations.

25.5 AUTOMATIC AIR RELIEF VALVES

25.5.1 Provide automatic air relief valves, Sarco or equal, at all high points in hot water piping circuits and where indicated. Air relief valve shall be 15mm, suitable for a working pressure of 900kPa, with non-shock water. Drain piping shall be taken to discharge at a deep seal trap or point ad indicated. A stop valve is to be fitted on the upstream side of all air relief valves.

25.6 HOT WATER CIRCULATION PUMPS

25.6.1 Provide and install where specified hot water circulating pumps, in-line type, with close grained cast iron casing, and bronze, balanced impellers. Pumps shall be of the capacity and head as indicated, and have spring loaded mechanical seals, with rubber ring rotating against stationary carbon seat. The circulation pumps shall at a minimum be installed in a N+1 configuration, staggered with two separate isolators, one supplying each pump. Refer to the engineers standard drawing details for reference.

25.7 IMMERSION THERMOSTATS FOR STARTING PUMPS

25.7.1 Provide for the automatic control of hot water circulators, immersion type thermostats in the return water line. Thermostat shall operate an IT switch, which shall start and stop the pump.

25.8 PRESSURE GAUGES

25.8.1 Provide a pressure gauge on each water service at meter location, on discharge headers, on house and hydro pneumatic tank pumps, on inlet and outlet of each master pressure reducing valve assembly, and where noted.

25.8.2 Pressure gauges shall be 80mm diameter with black enamel cast iron case, brass ring with heavy glass, phosphor bronze single spring Bourdon tube, and phosphor bronze bushed rotary precision movement and suitable dial range with at least 1% accuracy with brass tee handle cock. Pressure gauges shall be calibrated in KPa.

25.9 THERMOMETERS

25.9.1 Provide dial type thermometers in oversized tees and nipples on HW supply and return lines, and where noted.

25.9.2 Thermometers shall be 80mm diameter with CP brass case, threaded ring with heavy glass, vapour pressure or liquid actuated bronze single spring Bourdon connection with copper bulb.

25.10 TESTS

25.10.1 Test piping and prove tight as specified and/or required by Authorities having jurisdiction; in presence of Engineer and said Authorities, who shall be given 48 hours' notice in advance before tests are made. Make preliminary tests and prove satisfactory before requesting witnessing of final tests. Make tests in stages if so ordered by the Engineer to facilitate work of others. Repair defects disclosed by tests or if required by Engineer, replace defective work.

25.10.2 Subcontractor shall be required to attend with the Engineer and give all assistance required and provide such tools, materials, implements and instruments as are necessary for tests. The Engineer reserves the right to call for such additional tests, such as dynamic tests, as he may consider necessary.

25.10.3 Subcontractor shall be responsible for work of other Trades disturbed or damaged by tests or repair and replacement of work and shall cause work so disturbed or damaged to be restored to its original condition at own expense.

25.10.4 The pipe installation shall be hydraulically pressure tested by means of a suitable manually operated or mechanically driven pressure pump.

25.10.5 A pressure of at least 1.5 times the working pressure of the class rating of pipes, or fittings shall be applied for a period of time specified in the specifications or as recommended by the manufacturers.

25.10.6 Tests should not be performed against closed valves, but not against equipment that is pressure &/or sensitive.

25.10.7 Leakage which occurs shall be measured and calculated and checked against the allowable losses.

25.10.8 If the completed section of pipe complies with all specifications and passes the tests and inspection, it could be approved and the contractor may be instructed to backfill the open sections of trench at the joints and connections, where applicable.

25.10.9 The contractor shall then proceed to build all the valve chambers, inspection chambers etc.

25.11 STERILISING/DISINFECTION OF WATER PIPES

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

25.11.2 At least 14 days prior to the commencement of sterilising the contractor shall submit the full details of the proposed method of sterilising the pipeline to the engineer for his approval.

25.11.3 The contractor shall provide all necessary materials, tools, equipment and labour necessary to sterilise the pipeline. After sterilising the pipeline the sub-contractor shall, at no extra cost to him/herself, empty the pipeline and dispose of the water in a manner approved by the Commission Agent, Green Consultant & the Engineer.

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

a) Chlorine of lime to SANS 295 yielding 33% free chlorine by mass.

b) Calcium hypochlorite to SANS 295 yielding 70% free chlorine by mass.

c) Chlorine gas applied by chlorinator.

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

25.11.6 After pressure tests have been made, the unit to be disinfected shall be thoroughly flushed with water until all entrained dirt and mud have been removed before introducing the chlorinating material which shall provide a dosage of not less than 50 parts per million and shall be introduced into the water lines in an approved manner.

25.11.7 The treated water shall be retained in the pipe long enough to destroy all non-sporic-forming bacteria. Except where a shorter period is approved, the retention time shall be at least 24 hours and shall produce not less than 10 parts per million of chlorine throughout the line at the end of the retention period.

25.11.8 All valves on the lines being disinfected shall be opened and closed several times during the contract period. The line shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 parts per million. From several points the contractor shall take samples of water in properly sterilised containers for bacterial examination. The disinfection shall be repeated until tests indicate the absence of pollution for at least 2 days. The unit will not be accepted until satisfactory bacteriological results have been obtained. The contractor shall arrange for a field laboratory, approved by the Consultant, to conduct all bacterial examinations required.

25.11.9 It is required to take a control sample of the incoming water at the same time as the other samples are taken. All disinfecting shall be as laid out in SANS 10252-1.

26 SANITARY FITTINGS

26.1. Install and connect up kitchen and toilet fittings as specified in the schedules, or provided under work of other divisions and/or owner, and provide required trim and "P" traps for same as specified.

26.2 Provide water supply fixtures with stop valves. Exposed pipe fittings, traps, escutcheons, valves, valve handles and accessories, both above and below fixtures, shall be CP brass (covering tubes not permitted).

26.3 Water supply and drainage nipples shall be brought to the wall and covered by CP escutcheons.

26.4 Supply fixtures shall be renewable seat composition washer, all metal indexed handles and integral on separate screw driven or lock shield stops. No manufacturer's name allowed on exposed portion of fixtures.

26.5 During course of construction, protect exposed fittings from damage and cover fixtures with wooden protection housings. Uncover and thoroughly clean fixtures and fittings when directed.

26.6 Fixture connections shall be at least as follows with Nominal diameters shown:

FIXTURE	DRAIN	VENT	CW	HW
Water Closets Flush Valve	100mm	50mm	32mm	-
Water closet with cistern type flush mechanism	100mm	50mm	15mm	-
Urinals	50mm	40mm	25mm	-
Showers	40mm	40mm	15mm	15mm
Wash Hand Basins	32mm	32mm	15mm	15mm
Bath	40mm	40mm	20mm	20mm
Sink	40mm	40mm	15mm	15mm
Slop hopper	100mm	50mm	25mm	-
Sluice combination bedpan wash-up sink	100mm	50mm	32mm FM, 20mm S	20mm
Waste disposal unit	100mm	50mm	15mm	
Scrub sink	50mm x 2	40mm	20mm	20mm
Soluscope washer	50mm	40mm	15mm	-

27.1 SANITARY FITTINGS SHALL BE INSTALLED AS FOLLOWS:-

26.7.1 Precast Concrete Wash Troughs

- Precast concrete wash troughs shall be bedded on top of pedestals which shall be bedded on floors in 1:3 cement mortar.

26.7.2 Stainless Steel wash Troughs and Wash Hand Basins

- Stainless steel wash troughs and wash hand basins shall be fixed to walls on a pair of 20mm diameter galvanised mild steel pipe brackets with flanged ends cut and pinned 150mm deep into walls in 1:3 cement mortar.

26.7.3 Acrylic Resinous Wash Hand Basins

- Acrylic resinous wash hand basins shall be fixed to walls on a pair of standard painted cast iron brackets screwed to underside of basin and bolted to wall with 6mm diameter expanding bolts.

26.7.4 Ceramic Wash Hand Basins

- Ceramic wash hand basins shall be fixed to walls on a pair of standard painted steel or cast iron brackets bolted to wall with 6mm diameter expanding bolts.

26.7.5 Acrylic Resinous Baths

- Acrylic resinous baths shall be bedded in 1:5 cement mortar on three cross rows of bricks or bedded solid on a layer of dry river sand and fixed to wall with galvanised steel brackets under edges (in the middle of the sides against walls) bolted to wall with 6mm diameter expanding bolts and sealed along top against wall finishes with patent mildew resistant silicone rubber.

26.7.6 Wash-down Closet Pans and Cisterns

- Wash-down closet pans shall be bedded on floors in 1:3 cement mortar. Cisterns shall be fixed to walls with 6mm diameter expanding bolts.

26.7.7 Ceramic Urinals

- Ceramic stall and slab urinals shall be bedded on floors and against wall in 1:3 cement mortar. Slabs, channels, treads etc. shall be jointed in 1:3 cement mortar and pointed in white cement.

- Ceramic bowl urinals shall be fixed to walls on standard steel brackets bolted to wall with 6mm diameter expanding bolts. Cisterns shall be fixed to walls on standard brackets to wall with 6mm diameter expanding bolts.

26.7.8 Stainless Steel Urinals

- Stainless steel urinals shall be bedded on floors in 1:3 cement mortar and with backs and sides against walls filled in with fine unreinforced concrete. Cisterns shall be fixed as cisterns for ceramic urinals.

27 HOT WATER GENERATION AND SANS 10400 XA

27.1 All hot water generation equipment shall comply with SANS XA-2 & have an alternative energy source of at least 50%.

27.2 Solar installations shall comply with SANS 10106.

27.3 Heat pump installations shall comply with SANS 1352.

27.4 Any other alternative source, such as Heat Accumulators, etc. shall be installed to the Engineers specifications & manufacturers' shop drawings provided.

28 ELECTRICAL WIRING INSTALLATION

28.1 GENERAL

28.1.1 The installation of cables in buildings, and in the ground for system voltages up to 11000 volts, 50Hz, shall conform to the following standards:

A. SANS 10142-1
B. SANS 10142-2
C. SANS 1507
D. SANS 97
E. SANS 1339
F. SANS 10198 part 1 to 13

28.1.2 Please note that all amendments published at the time of tender shall be applicable.

28.2 CABLE TYPES

28.2.1 The following cable types shall be used, unless otherwise specified in the detailed technical specification:

- Medium voltage supplies (6600/11000 Volts):

  Paper insulated, lead covered, steel armoured, screened and drained (general use), manufactured to SANS 97 (table N)
  or
  Cross-linked polyethylene (XLPE) with copper conductors and screened with a brass sheath manufactured to SANS1339.

- Low voltage:

  PVC insulated steel wire armoured manufactured to SANS1507, Low Halogen Type.
  Un-armoured PVC insulated cables may only be used if specified in the detail specification and measured in the bills of quantities.

- Connections to equipment:

  PVC insulated steel wire armoured or unarmoured when installed in conduit or metal trunking. Cable bending radius shall be as specified in SANS 10142-1.

28.2.2 All cables supplied shall have the following information on the cables:

- Every meter the length of a cable shall be visible
- The size of the cable shall be marked on the cables
- The applicable SANS number to which the cable complies with

28.2 CABLE TAGGING

28.2.1 All cables shall be identified at each termination by means of punched metallic bands or engraved PVC tags cable tied to cable. PVC tape with printed characters will not be accepted.

28.2.2 The following shall appear on the cable tags:

- At point of supply:

  Cable voltage, Cable size, Cable type, and Supply to DB-XXX – Normal/Emergency/UPS Section or equipment name e.g. 11kV, 70mm² 4 Core XLPE – Supply to Transformer 1

- At point of consumption:

  Cable voltage, Cable size, Cable type, and Supplied from DB-YYY – Normal/Emergency/UPS Section e.g. 400V, 95mm² 4 Core PVC – Supply from DB-MLV

28.1.3 Identification numbers of cables shall be shown on the "as built" drawings of the installation.

28.3 TESTING

28.3.1 Each cable shall be tested after installation in accordance with SANS 1507 and SANS 97 and SABS 1339 (up to 11kV) as well as the requirements of the Local and Supply Authorities.

28.3.2 The minimum acceptable insulation resistance values for the cables shall be calculated as follows:

$$R_{Insulation} = (V_{Rated} + 1) * (\frac{304.8}{L})$$

Where:

$R_{Insulation}$ is the Minimum acceptable insulation resistance value, in mega-ohms
V_{Rated} is the rated voltage of the cable, in kV
L is the length of the cable in meters

- LV Cables

  LV cables shall be tested by means of a suitable insulation resistance tester at 2,000Vac (RMS) or 3000Vdc for a period of 15min and the insulation resistance shall be tabulated and certified.

- MV Cables

  New PILC cables may be tested using DC voltages as per the table below, however existing PILC cables shall be tested using VLF testing – Test voltages are as per table 1.

  XLPE cables shall be tested as using VLF Testing – Test voltages are as per table 1.

Cable Rating (kV)	TEST VOLTAGE (Applied for 15 Minutes)				
	New Paper-insulated cables				XLPE-insulated cables & Existing PILC Cables
	Between conductors		Conductors to sheath		Conductors to screen
	AC RMS (kV)	DC (kV)	AC RMS (kV)	DC (kV)	VLF RMS or (Peak) (kV)
6,6	12	18	12	18	9 (13)
11	20	30	20	30	11 (16)

Table 1

28.3.3 MV cables shall be pressure tested in accordance with the above Table and the exact leakage current shall be tabulated and certified.

28.3.4 The Contractor shall make all arrangements, pay all fees and provide all equipment for these tests. The cost of testing shall have been included in the tender price.

2/8.3.5 The Contractor shall notify the Engineer and if applicable the Supply Authority at least 7 days prior to the tests so that their representatives may witness the tests.

28.3.6 On Completion of the tests on any cable, the Contractor shall without delay, submit three copies of the certified Test Reports to the Engineer.

28.3.7 The contractor shall provide all the testing equipment as required for the respective tests.

28.4 JOINTS

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

28.4.2 No joints in cable runs will be allowed unless a cable run exceeds the maximum length available on a cable drum. (Normally 300 m)

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

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

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

28.4.6 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.

28.4.7 Outdoor termination must be able to withstand air pollution and bad weather without any signs of surface current tracking.

28.4.8 Termination for high voltage cables must have a satisfactory stress relief in order to keep the partial discharges extinguished.

28.4.9 Taped or prefabrication terminations may be used, in accordance with the manufacturer's recommendation.

28.5 CONNECTION OF CABLE CORES

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

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

28.5.3 Suitable lugs shall be crimped to cable core ends using mechanical or pneumatic tools designed for this purpose.

28.5.4 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.

28.5.5 Ferrules shall be used where cable cores are connected directly to equipment with screws against the conductor strands.

28.6 TRENCHING

28.6.1 The Contractor shall, before trenching commences, familiarise himself with the routes and site conditions. The procedure and order of doing the work shall be coordinated with the general construction programme.

28.6.2 The Contractor shall acquaint himself with the position of all the existing electrical, civil and other services before excavation is commenced.

28.6.3 The Contractor will be held responsible for damage to any such existing services and shall be responsible for the cost of repairs.

28.6.4 The Contractor shall ensure that the excavations will not endanger existing building structures, roads, railways, other site constructions or other property before excavating.

28.6.5 The Contractor shall take all the necessary precautions and provide the necessary warning signs, barricades and/or lights to ensure that the public and/or personnel on site are not endangered.

28.6.6 Trenches crossing roads, footpaths or access ways shall not be left uncovered. If cables cannot be laid immediately the Contractor shall install temporary cover plates etc., of sufficient strength to accommodate the traffic concerned.

28.6.7 The bottom of the trench shall be smooth and free of any sharp dips or rises which may cause tensile forces in the cable during backfilling.

28.6.8 The nature of the soil that can be encountered is classified as follows:

- Very hard rock shall mean rock that can only be excavated by means of explosives.
- Hard Rock shall mean granite, quartzitic sandstone, slate and rock of similar or greater hardness, solid shale and boulders over 0,03 cubic metre in volume.
- Soft rock shall mean rock that can be loosened by hand-pick and includes hard shale, compact gravel stone and rocks from 75mm in diameter up to 0,03 cubic meters in volume.
- Soil shall mean ground that can be removed by pick and hand shovel and includes loose gravel, clay, made-up ground, loose or soft shale, loose gravel stone and rocks less than 75 mm in diameter.

28.6.9 Should blasting be necessary, the Contractor shall obtain all necessary authorities from the relevant Departments and Local Authorities. The Contractor shall take full responsibility and observe all conditions and regulations set forth by the above Authorities.

28.6.10 The necessary insurance cover must be obtained to cover possible damage and losses.

28.6.11 Blasting shall be subject to the approval of the Engineer.

28.7 CABLE SLEEVES

28.7.1 Where cables cross under roads, railway tracks, other service areas, etc. and where cables enter buildings, the cables shall be installed in hard walled PVC or earthenware pipes. Road and railway crossings shall be done at right angles.

28.7.2 Sleeves shall have a minimum diameter as specified and shall extend at least 1,0 m beyond the road edge or kerb on either side of the crossing.

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

28.7.4 Where sleeves have to be built into structures by others, the Contractor shall supply the sleeves and ensure that they are installed correctly.

28.8 CABLE INSTALLATION AND BACK FILLING

28.8.1 Before the cable is laid into the trench the bottom of the trench shall be filled across the full width with a 75 mm layer of suitable sifted soil and levelled off. After cable laying a further layer of bedding shall be provided to extend to 75 mm above the cables.

28.8.2 If there is no suitable soil available on site, the Contractor shall import fill and make all the necessary arrangements to do so. The cost of importing soil for bedding purposes shall be included in the rates for excavations.

28.8.3 The bedding under joints shall be fully consolidated to prevent subsiding.

28.8.4 The Contractor shall not commence with the back filling of trenches before the Engineer has inspected the cable installation. Should the Contractor fail to give a timeous notification, the trenches shall be re-opened at the Contractor's cost. Such an inspection will not be unreasonably delayed.

28.8.5 Cables (1000V to 11000V) shall be provided with a yellow coloured plastic marking tape installed 400 mm above the cable. The tape shall be marked with a red skull and crossbones with the words "Electric Cable". This marking shall be installed over the entire length of the cable.

28.8.6 The maximum accepted diameter of stones present in the back fill material is 75 mm.

28.8.7 The back fill shall be compacted in 150mm layers and sufficient allowance shall be made for final settlement. The Contractor shall maintain the refilled trench at his expense for the duration of the contract. The surface shall be made good to the same density and to match the surrounding areas on completion.

28.8.8 In the case of road ways or paved areas the excavations shall be consolidated to the original density of the surrounding material and the surface finish reinstated.

28.9 CABLE MARKERS

28.9.1 Cable markers shall consist of concrete blocks dimensioned as follows:

28.9.2 300mm high, 150mm x 150mm at the top and 250mm x 250mm at the bottom.

28.9.3 A brass plate for labelling shall be cast into the tops of the blocks in such a manner that they cannot be prised loose. The wording as follows as well as arrows indicating cable direction shall be clearly stamped on the brass plates.

- For HV cable route - "HIGH VOLTAGE CABLES".
- For MV and LV cable routes - "ELECTRICAL CABLES"
- For joint positions - "ELECTRIC CABLE JOINT".

28.9.4 Cable markers shall be installed on the surface along all the underground routes and shall project 50 mm above finished or natural ground level. If the projected markers could be a hazard to pedestrians or other traffic, they shall be installed flush with the surface.

28.9.5 Cable markers shall be installed at all changes of direction, at the beginning and end of cable runs (i.e. where a cable enters a substation or building), above all joints above cable pipe entries and exits and at intervals not exceeding 50m along the cable route. The position of cable markers shall be indicated on the "as built" drawings.

28.10 PROVINCIAL ADMINISTRATION, NATIONAL ROAD AND S.A.R. CROSSINGS

28.10.1 The Contractor shall conform with the various Administrations' requirements with regard to the crossing of Provincial and National roads, especially with regard to safeguarding of the public and traffic control. The Contractor shall also provide proof of adequate insurance cover against any claim from any accident as a result of work done by the Contractor during the crossing operation. The Owner shall be indemnified from all liability in this regard.

28.10.2 The Contractor shall liaise with the various Administrations and Traffic Departments etc., well in advance regarding the intended dates, times and expected duration of the crossing operations and obtain their approval of the programme and method of operation before work is commenced.

29 INSTALLATION OF CABLES

29.1 INSTALLATION DEPTHS IN GROUND

29.1.1 All cables laid directly in the ground shall be laid at a depth such that the vertical distance from the top of the cable to the ground surface is not less than the values given below:

- Cables in open ground or under
- pedestrian paved areas HV Cables MV & LV Cables
- Residential Sites 750 mm 450 mm
- Industrial and Commercial Sites 1 000 mm 600 mm
- Road Crossings 1 100 mm 1 100 mm
- Railway Crossings 1 500 mm 1 500 mm
- (From top of sleepers)

2.1.2 Cables shall not be laid direct in the ground if any corrosive agent is found to be present.

29.1.3 Before cable laying is commenced, all cable trenches shall be drained, the bottoms graded and compacted and all loose stones and similar debris removed.

29.1.4 Cable trench width for one or two cables shall be a minimum of 550 mm. The width shall be increased as more cables are installed allowing for at least two cable diameters spacing for each cable added.

29.2 CABLE LAYING

29.2.1 Cable rollers shall be used at all times to run out cables. Rollers shall be spaced so that the length of cable will be totally suspended during the laying operation.

29.2.2 Where cables have to be drawn through pipes or ducts, a suitable cable sock shall be used and care shall be exercised to avoid abrasion, elongation or distortion of any kind.

29.2.3 Where cables have to be drawn around corners, well lubricated securely fixed skid plates shall be used.
CABLES SHALL BE PULLED INTO TRENCHES ETC., BY HAND ONLY.

29.3 SPACING OF CABLES IN GROUND

29.3.1 Cables installed in a common trench shall be laid parallel to each other spaced as follows: (LV: up to 1000V; HV: 1000V to 11000V):

- LV/LV : 2 cable diameters
- LV/HV : 300 mm minimum

29.3.2 Where HV and LV cables have to be installed in the same trench, the HV cable shall be laid on the one side of the trench at a depth as specified in 2.1 and then covered with soil. The LV cable shall then be laid on the other side of the trench at the depth specified in item 2.1.

29.3.3 Cables shall not be buried on top of each other unless layers are specified. The minimum spacing between layers shall be 200 mm.

29.3.4 Cables for telephones, communication systems and other low voltage systems (less than 50V) shall be separated from power cables by at least 1000mm. All control or pilot cables shall be laid at least 300mm from power cables.

29.4 CABLE BENDING RADIUS

Please refer to the table below for the minimum cable bending radius:

Type of Cable	Type of cable	Outside Diameter of cable [mm]	Minimum bending radius
PVC Insulated	Unsheathed	$d \leq 10$ $10 < d \leq 25$ $25 < d \leq 40$ $40 < d$	3d 4d 6d 8d
	Sheathed but un-armoured		8d
	Armoured		10d
Paper Insulated	Lead Sheathed		15d
XLPE			15d

30 INSTALLATION IN BUILDINGS

30.1 GENERAL

30.1.1 Particular attention shall be paid to the application of grouping factors in respect of current rating and the appropriate spacing of cables shall be allowed.

30.1.2 Cables for services above 650 volts shall be run separately from all other cables with a minimum clearance of 2300 mm. Cables for service below 100 volts including sound and telephone systems shall also be segregated from all other cables.

30.1.3 All cables shall be adequately supported throughout their length as specified by the Wiring Regulations or, where not specified as recommended by the cable manufacturers. No joints shall be allowed in cables of less than 300 m length, unless as specified or specifically approved.

30.2 CABLE FIXINGS ABOVE FLOOR LEVEL

30.1.1 On Cable ladders:

- Cables shall be secured to the cable ladder by means of minimum 12.7mm cable ties at intervals not exceeding 1500mm for horizontal runs and 750mm for vertical runs.

30.1.2 Mounted on unistrut supports:

- The intervals of the supports shall be such that no cable sagging occurs, but minimum interval shall be 750mm. Cables shall be secured with the appropriate size cable K or U clamp onto the unistrut support.
- Mounting directly onto wall
- Appropriate cable saddles shall be used to secure the cable to the wall, at minimum 750mm intervals.
- Single core cables comprising of three phase circuit shall be laid throughout in trefoil formation, each cable touching. They shall be fixed with hardwood blocks or purpose made cleats supported on steelwork or proprietary rails segregated from all other cables and located in a protected situation.

30.3 CABLES IN CONCRETE TRENCHES

30.3.1 In concrete trenches cables shall be laid side by side on the bottom of the trench without cross-overs. When necessary to maintain spacing factors cables shall be fixed to the sides of the trench using cleats as specified for installation above floor level.

30.4 CABLES IN DUCTS

30.4.1 The total cross sectional area of all cables installed in a duct shall not exceed 50% of the internal cross sectional area of the duct. After installation of the cables, duct stoppers shall be fitted to each end of each duct run and at the entry to the building to effectively seal the duct from ingress of vermin, etc.

31 LV ASSEMBLES

31.1 GENERAL

31.1. This specification covers the design, manufacturing, and installation and testing of factory built distribution boards, motor control 1centres and outdoor kiosks.

31.2 STANDARDS

31.2.1 Factory built distribution boards and motor control centres shall comply with the following standards:

A. SANS 10142-1
B. SANS 1973-1, 3 and 8
C. SANS 60439-1 to SANS 60439-5
D. SANS 61439-1 to SANS 61439-6
E. SANS 60529
F. Occupational Health and Safety Act 85/1993

31.2.2 **Please note that all amendments to these standards published at the time of tender shall be applicable.**

32 CONSTRUCTION

32.1 GENERAL REQUIREMENT

32.1.1 The manufacturer shall design the distribution board based on the single line diagram provided by the engineer to ensure that all switchgear and control gear can be fitted within the enclosure with 30% spare space for future additions without the need to change the assembly construction. The unused spaces shall be covered by means of blanks to ensure that the IP rating of the assembly remains in tack.

32.1.2 As a minimum the assemblies with the fault levels as stated shall comply to the following standards:

- fault level ≤ 10kA shall comply with SANS1973-3
- fault level > 10kA with operating current less than 1600A – SANS 1973-8 (Only if specified)
- fault level > 10kA shall comply with SANS1973-1 / SANS60439 / SANS61439

32.1.3 All enclosures or partitions including locking means and hinges for doors shall be of sufficient mechanical strength to withstand all mechanical stresses to which it may be subjected to during normal and short circuit conditions.

32.1.4 Prior to construction the manufacturer shall submit general arrangement drawings containing the following:

- Physical size, i.e. height, width and length
- Weight
- Transport section
- Rated operating voltage
- Rated insulation voltage
- Rated operating current
- Rated short time withstand currennt
- IP rating
- Detail control diagrams
- Schedule with make, model and rating of all switchgear and control gear

32.1.5 All switchgear and control gear used within the assembly shall comply with Section IV.6 of this specification. The manufacturer needs to ensure that the selection of the co-ordination of the protective devices are done to ensure selectivity of the protective system and needs to be proven by the supplier of the protective equipment.

32.2 ELECTRICAL CHARACTERISTICS

32.2.1 All assemblies shall have the following electrical characteristics:

DESCRIPTION	SINGLE PHASE ASSEMBLIES	THREE PHASE ASSEMBLIES
The rated operating voltages	231V	400V
The rated insulation voltage	1000V	1000V
The Rated Impulse withstand voltage	6000V	6000V
Rated Frequency	50Hz	50Hz

32.2.2 The rated current and rated short time withstand current shall be as noted on the single line diagrams.

32.2.3 The minimum creapage and clearance distances shall be as follows:

	PHASE TO PHASE	PHASE TO EARTH
Clearance in Air	8	8
Creepage distance	16	16

32.3 MATERIAL

32.3.1 Assemblies shall be constructed only of materials capable of withstanding the mechanical, electrical and thermal stressses as well as the effects of humidity. The minimum thickness of the galvanised / alloy cold rolled zinc steel that will be used is **2mm**, unless the ridgitness of a thinner material can be demonstrated.

32.3.2 The enclosure shall be protected against corrosion by applying a suitable coating on the exposed surfaces.

32.3.3 All metal parts shall be externally and internally prepared for painting in accordance with SANS 10064, thereupon treated with baked enamel primer, and finally finished in an infra-red baked enamel, in the colour externally called for in the Detail Specification and the minimum thickness of the finished product shall be 85µm.

32.3.4 Assemblies can be wall mounted, free standing with front access only or free standing with front and rear access.

32.3.5 For panels with front access only, a cable way of at least 400mm shall be provided where practical possible.

32.3.6 The gland plates shall be galvinsed and at least 3mm thick and shall be bonded to the main earth bar by means of copper conductor in accordannce with the table below:

RATED OPERATIONAL CURRENT I_E	MINIMUM CROSS SECTIONAL AREA OF THE PROTECTIVE / BONDING CONDUCTOR
$I_e \leq 20A$	Same as the phase conductor
$20A < I_e \leq 25A$	2.5mm²
$25A < I_e \leq 32A$	4mm²
$32A < I_e \leq 63A$	6mm²
$63A < I_e$	10mm²

32.3.7 Gland plates and cable support bars must be placed at suitable heights to allow for the bending radius of the cables concerned and making off of cables. Gland plates for single core cables shall be manufactured from insulating material of adequate strength.

32.4 DOORS AND COVERS

32.4.1 Where doors are provided it shall have at least the following number of hinged points:

HEIGHT [H]	NO OF HINGED POINTS
H ≤ 450mm	2
450<H≤800mm	3
H > 800mm	4

32.4.2 All doors shall be fitted with rubber or neoprene seals.

32.4.3 Door and cover latches shall be of rubust construcition and shall be manufactured from steel. Doors and covers shall be secured by sqaure key latches as follows:

HEIGHT [H]	NO OF LATCHES
H ≤ 450mm	2
450<H≤800mm	3
H > 800mm	4

32.4.4 Doors and covers greater than 800mm shall be provided with stiffeners / webs to avoid wobling.

32.4.5 All doors with electrical equipment mounted on it shall be bonded to the protective earth conductor by means of at least a 4mm² multi strand conductor.

32.5 GREE OF PROTECTION

32.5.1 All distribution boards shall be moisture proof, vermin proof and adequately ventilated. Distribution boards shall at all times ~~shall~~ be protected against damage, moisture, dust and vermin. If IP rating is not specified on the single line drawings or the detail specification the following minimum ratings shall be applicable and shall be tested in accordance with SANS 60529:

- Indoor use IP3X
- Outdoor use IP54
- Cable entry IP2X

32.6 FORM OF SEPERATION

32.6.1 The form of seperation shall be as specified on the single line diagrams issued with the specification.

32.7 DEGREE OF POLLUTION

32.7.1 Unless otherwised specified the assembly shall be rated for a degree of polution of 3.

32.8 LABELLING

32.8.1 All labels shall be of engraved Trafolite or similar plastic material and shall be fixed by means of machine screws or aluminium channelling.

32.8.2 Lettering shall be black on white background. Glued-on plates or embossed plastic self-adhesive tape labels shall not be accepted.

32.8.3 The distribution board ID as well as where the panel is supplied from will be secured to the panel.

32.8.4 All circuit breakers, contactors, timers, switches, relays, pushbuttons, terminals, etc., must be clearly labelled as to their title or function.

32.8.5 All wire ends to contactors, relays, terminal strips, etc., must be clearly numbered by means of slip-on plastic ferrules. Self-adhesive tape markers shall not be acceptable.

32.8.6 All terminal strips must be numbered on both incoming and outgoing sides by means of suitable clip-on numbers. Should the incoming and outgoing wire numbers be identical, then numbers on one side only of a terminal strip shall be acceptable.

32.8.7 A suitable legend card (paper shall not be acceptable) covered by a removable glass or perspex panel shall be provided and installed inside the door or on the face of the panel. This legend card shall give the designation of the various outgoing circuits, the corresponding circuit breaker numbers in the board and the area where the circuit is taken to. i.e. lights, L1, Kitchen.

32.8.8 During construction temporary hand written legend cards shall be used. Final legend cards must be typed. Hand written final legend cards shall not be accepted.

32.8.9 The following information shall appear on the name plate which shall be secured to the assembly's incomer section:

- Assembly ID
- Manufacturer's trade name, address and contact number
- Standard to which the panel has been manufactured and tested
- Main busbar current rating
- Rated short time withstand current
- Rated operating voltage
- Rated insulation voltage
- IP rating
- Form of seperation
- Degree of pollution

32.8.10 Where series connected (cascaded) systems are used the warning label shall be fitted on the incommer section of the assembly as noted in the SANS10142-1 regulations.

32.7 BUSBARS

32.7.1 The busbar system shall be manfactured of high conductivity copper complying with SANS804.

32.7.2 Joints in the busbars shall overlap not less than 6 times the thickness of the busbar or shall equal the width of the busbar whichever is the greater. A minimum of two bolts with conical or spring washers shall be used to secure the joint.

32.7.3 The support system shall be designed to cater for the rating of the short time withstand rating of the assembly.

32.7.4 Busbars shall be identified to confirm to which phase it is connected to using Red, White, Blue and Black for Neutral.

32.7.5 In a multi phase assembly the neutral bar size shall not be less than 50% of the phase conductor.

32.7.6 All busbar connections shall be torqued and marked to the standard torque settings.

32.8 EARTHBAR

32.81 Each board shall be equipped with a copper earth bar over the full length of the board to allow for the termination of all the incoming and outgoing earth conductors. The protective earth conductor shall be colour coded Green with a Yellow Stripe or left bare.

32.9 WIRING

32.9.1 All internal wiring shall either be laced or run in wiring channels and shall be clearly marked with numbered ferrules and colour coded.

32.9.2 Only one neutral and one earth wire will be allowed per terminal.

32.9.3 The minimum wiring which may be used in the fault free zone is 16mm², and shall be braced at least every 300mm.

33 OUTDOOR KIOSKS

33.1 Outdoor metering or distribution kiosks shall comply with NRS056

33.2 The outdoor kiosks shall be manufactured from 2,0 mm cold rolled sheet steel minimum and shall be of a robust, weather and tamper-proof construction with smooth outer surfaces free of bolt heads, screws, etc. and shall be mounted on a heavy channel iron base. The kiosks shall be designed and constructed to be completely vermin proof and shall be divided into compartments as called for in the "Schedules".

33.3 An inner angle iron frame shall be fitted for the fixing of the equipment chassis and gland plates. The chassis shall be of rigid construction suitable for the mounting of all equipment specified and must be provided with all the necessary means for the secure fixing of all circuit breakers, isolators, meters, etc.

33.4 All chassis shall be adequately protected against corrosion either by galvanising or painting in an approved manner.

33.5 Face panels shall be manufactured from 2,0mm sheet steel, suitably folded to ensure adequate panel rigidity.

33.6 Face and circuit breaker toggles to protrude.

33.7 Meters and single phase circuit breakers shall be flush-mounted behind a removable sheet steel face panel suitably punched to allow only the meter.

33.8 Doors shall be manufactured from 2,0mm sheet steel minimum and shall be of robust construction, suitably folded and braced to ensure adequate stiffness, and the metal surface shall be free from dents and ripples.

33.9 Each compartment shall be provided with a hinged, tamper-proof, weather tight door, complete with robust padlockable turn-catch.

33.10 Effective dust seals must be provided around the edges of doors to ensure that boards are dust and weatherproof.

33.11 The hinges and locking devices shall be of tamper-proof construction and shall be of a corrosion-resistant material.

33.12 Ventilation slots or louvers, each fitted with a non-rusting wire screen shall be provided. These vents shall be so designed as to prevent the ingress of rain, bugs and vermin but will allow adequate ventilation to prevent condensation from forming inside the kiosk.

33.13 On each door a cast aluminium scull and crossbone danger sign in white letters on a red background must be provided and permanently fixed.

33.14 The kiosks shall be suitable for bolting down on concrete plinths. A fully dimensioned drawing of the kiosk with details of the base must be made available to allow suitable plinths to be constructed.

34 TYPE TESTED ASSEMBLIES (TTA) AND PARTIALLY TYPE TESTED ASSEMBLIES (PTTA)

The standard to which the assembly needs to comply will be specified in the detail specification.

34.1 OPTION A – SANS 60439

34.1.1 Where type tested assemblies are required complying to SANS 60439 the manufacturer shall provide a valid type test certificate containing all eight type tests, i.e.:

- Temperature rise limits
- Dielectric properties
- Short-circuit withstand strength
- Effectiveness of protective circuit
- Short-circuit withstand strength of a protective circuit
- Clearances and creepage distances
- Mechanical operation
- Degree of protection

34.1.2 Any deviation from the type tested design must be substantiated by the rules of the Engineering Design System (EDS)

34.2 OPTION B – SANS 61439

34.2.1 Where type tested assemblies are required complying to SANS 61439 the manufacturer shall provide a valid type test certificate containing all eight type tests, i.e.:

- Strength of material and parts
- Temperature rise limits
- Dielectric properties
- Short-circuit withstand strength
- Protection against electric shock and integrity of protective circuit
- Incorporation of switching devices andd components
- Internal electrical circuits and connections
- Terminals for external coonductors
- Clearances and creepage distances
- Mechanical operation
- Degree of protection

34.2.2 A verification report shall be submitted with the submission of the drawings to the engineer containing all the data used, calculations made and comparisons undertaken.

35 MINIMALLY TESTED ASSEMBLIES

35.1 Minimally tested assemblies shalll only be accepted where specified in the detail specification. Where this is acceptable the assemmbly shall comply with SANS 1973-8.

36 FACTORY ACCEPTANCE TESTS

36.1 Prior to the assembly leaving the factory, the manufacturer / contractor shall notify the client that the assembly is ready for a factory acceptance test at least one week prior to the required FAT date.

36.2 Any assembly delivered to site without the client / consultant signing a factory release document after the FAT shall be rejected.

36.3 During the FAT the client / consulting engineer will witness the following:

36.3.1 Verifying that the assembly is manufactured as per the approved drawings, including confirmation that the ratings of the switchgear and control installed.

36.3.2 Inspect the finish of the panel and verifying the paint thickness, should the paint thickness not comply the panel will be rejected.

36.3.3 Visually verify the first diget of the IP rating using a probe

36.3.4 Inspect the wiring in the panel for compliance and neatness

36.3.5 Inspection and verifying the labelling

36.3.6 Verify clearances between phases and phase to earth

36.3.7 Verifying that all doors / covers fit properly

36.3.8 Witness the insulation resistance test

36.3.9 Witness the dielectric test

36.3.10 Witness the functionality of the control circuits

36.4 After the FAT the manufacturer / contractor shall issue a routine test certificate.

37 SWITCHGEAR AND CONTROL GEAR

37.1. GENERAL

37.1.1 This standard specification cover the requirements for the switchgear and control gear to be used in LV assemblies.

37.1.2 The contractor / panel manufacturer shall supply with the GA drawings of the LV assemblies the data sheets of the switchgear and control gear that will be used within the assembly complete with the type testing certificates thereof.

37.2. STANDARDS

The equipment shall comply with the following standards:

A. SANS 10142-1
B. SANS 60947-1
C. SANS 60947-2
D. SANS 60947-3
E. SANS 60947-4
F. SANS 156
G. SANS 556-1
H. SANS 61643-1
I. SANS 947-4-1

37.3. DESCRIPTION

37.3.1 Air Circuit Breakers (ACBs)

37.3.1.1 ACBs shall be of the fully type tested in accordance with the requirements of SANS 60947-2 and shall be of withdrawable type and shall have switch-disconnector characteristics.

37.3.1.2 ACBs shall have the following characteristics:

Rated Current (In)	As specified on single line diagram
Rate Operating Voltage (Ue)	≥600V
Rated Insulation Voltage (Ui)	≥800V
Rate Ultimate Short-circuit rating (Icu)	As specified on single line diagram
Rate Service Short-circuit Rating (Ics)	100% of Icu
Rate Short-circuit Making capacity (Icm)	As per SANS 60947-2
Rated frequency	50Hz

37.3.1.3 ACBs shall have the following properties:

- Quick make/break type spring assisted operating mechanism.
- Trip free mechanical manual closing mechanism.
- Manual operated mechanical trip mechanism suitably protected to prevent inadvertent tripping.
- Positively driven mechanical device to provide on/off/trip indication. This indication shall be clearly visible with the circuit breaker in position.
- Auxiliary contacts, if specified, shall be electrically separated.
- The fixed cradle shall be of a high mechanical strength.
- Clearly marked position indications as racked-out, test and engaged.
- It shall not be possible to insert an ACB unto a circuit of lower or higher rating than its rating.
- Automatic-operated shutters shall be provided so that on disconnecting the circuit breaker, these shutters cover the isolating to prevent inadvertent contact with live busbars and conductors.
- Shutters shall be capable of being padlocked in the closed position.
- The circuit breakers shall be provided with facilities to padlocked in the isolated position
- It shall not be possible to withdraw or insert of the unit when the circuit breaker is in the closed position.

37.3.2 Moulded Case Circuit Breakers (MCCBs)

37.3.2.1 MCCBs shall comply with VC 8036, SANS 556-1 and SANS 60947-2

37.3.2.2 MCCBs can be either fixed or withdrawable type, but shall be as specified on the single line diagrams.

Note: Adjustable thermal magnetic tripping units will be accepted for operating current of up to and including 250A, circuit breakers with higher rated current shall be supplied with adjustable electronic tripping units.

37.3.2.4 MCCBs shall have the following characteristics:

Rated Current (In)	As specified on single line diagram
Rate Operating Voltage (Ue)	≥230V Single pole ≥400V form multi pole
Rated Insulation Voltage (Ui)	≥250V Single pole ≥500V form multi pole
Rate Ultimate Short-circuit rating (Icu)	As specified on single line diagram
Rate Service Short-circuit Rating (Ics)	100% of Icu
Rate Short-circuit Making capacity (Icm)	As per SANS 60947-2
Rated frequency	50Hz

37.3.2.5 All MCCBs shall be equipped with adjustable inverse time delay over-current release with instantaneous tripping under short-circuit conditions in accordance with SANS 60947-2.

37.3.2.6 Where fixed type MCCBs are used the toggle shall protrude through the internal assembly cover. The MCCBs shall be supplied with a pad lockable device which shall be integral to the MCCBs, to enable locking the operating lever in the open (off) position.

37.3.2.7 Where withdrawable units are used the following shall apply:

- The fixed cradle shall be of a high mechanical strength.
- Clearly marked position indications as racked-out, test and engaged.
- It shall not be possible to insert an MCCB unto a circuit of lower or higher rating than its rating.
- Automatic-operated shutters shall be provided so that on disconnecting the circuit breaker, these shutters cover the isolating to prevent inadvertent contact with live busbars and conductors.
- Shutters shall be capable of being padlocked in the closed position.
- The circuit breakers shall be provided with facilities to padlocked in the isolated position
- It shall not be possible to withdraw or insert of the unit when the circuit breaker is in the closed position

37.3.3 Miniature Circuit Breakers (MCBs)

37.3.3.1 MCBs shall comply with VC 8036, SANS 556-1 and SANS 60947-2

37.3.3.2 MCBs shall have the following characteristics:

Rated Current (In)	As specified on single line diagram
Number of poles	As specified on single line diagrams
Rate Operating Voltage (Ue)	≥230V Single pole ≥400V form multi pole
Rated Insulation Voltage (Ui)	≥250V Single pole ≥500V form multi pole
Rate Ultimate Short-circuit rating (Icu)	As specified on single line diagram
Rate Short-circuit Making capacity (Icm)	As per SANS 60947-2
Rated frequency	50Hz

37.3.4 Earth Leakage Devices

37.3.4.1 Earth leakage untis shall comply with the following VC8035, SANS 60947-2, SANS 61008-1 & SANS 767-1

Rated Current (In)	As specified on single line diagram
Rated leakage current ($I_{\Delta n}$)	30mA unless otherwise specified
Number of poles	As specified on single line diagrams
Rate Operating Voltage (Ue)	≥230V Single pole ≥400V form multi pole
Rated Insulation Voltage (Ui)	≥250V Single pole ≥500V form multi pole
Rate Ultimate Short-circuit rating (Icu)	As specified on single line diagram
Rate Short-circuit Making capacity (Icm)	As per SANS 60947-2
Rated frequency	50Hz

37.3.4.2 The relays shall operate on the core balance principle to energise the trip coil of the associated circuit breaker by means of a static switching device or magnetic amplifier of simple design.

37.3.5 Switch Disconnectors

37.3.5.1 The switch disconnectors shall comply with SANS 60947-3

Rated Current (In)	As specified on single line diagram
Number of poles	As specified on single line diagrams
Rate Operating Voltage (Ue)	≥230V Single pole ≥400V form multi pole
Rated Insulation Voltage (Ui)	≥250V Single pole ≥500V form multi pole
Rate Short-circuit withstand rating (Icw)	As specified on single line diagram
Rated frequency	50Hz

37.3.5.2 Depending on the requirements as set out in the detail specification and single line diagrams the switch disconnectors shall have the same qualities as the circuit breakers with the same rated current and rated short circuit current.

37.3.6 Surge Protection Devices

37.3.6.1 Unless otherwise specified the minimum requirements as set out in the SANS 10142-1, shall be adhered to.

37.3.6.2 All surge protection devices for low voltage systems shall comply with SANS 61643-1 & 61643-12 and proof of compliance shall be submitted with the tender.

37.3.6.3 All main distribution boards were specified shall be provided with a protection against surge voltages on all three phases and the neutral conductor.

37.3.6.4 The lightning arrestors shall consist of a parallel circuit of metal oxide varistors and lightning current absorbing surface discharge arrestors (e.g. spark gap), which automatically quench the follow current.

37.3.6.5 Where Class 1 type surge protection devices are specified, the value of the impulse current (I_{imp}) for SPD's connected between phase and neutral shall not be less than 12.5kA for the 10/350µs wave form and for SPD's connected between Neutral and PE shall not be less than 25kA for single phase and 50kA for three phase systems 5kA for the 10/350µs wave form.

37.3.6.6 Where Class 2 type surge protection devices are specified, the value of the nominal discharge current for SPD's connected between phase and neutral shall not be less than 5kA for the 8/20µs wave form and for SPD's connected between Neutral and PE shall not be less than 10kA for single phase and 20kA for three phase systems for the 8/20µs wave form.

37.3.6.7 All Class 2 type surge protection devises shall visually indicate the end of life of the device and shall consist of two parts, a base and a plug-in protection module.

37.3.6.8 All elements of the surge protection installation shall be of one manufacturer.

37.3.6.9 The units shall be installed strictly in accordance with the manufacturer's instructions e.g., position, protection, wire sizes and lengths, etc.

37.3.7 Contactors

37.3.7.1 All contactors shall comply with SANS 60947-4-1.

37.3.7.2 Contactors shall be of the electromagnetic, air-break type and shall be arranged to interrupt all poles of the supply simultaneously. The number of poles shall be as specified on the single line diagrams.

37.3.7.3 All contactors used in supply circuits to fluorescent and gas discharge luminaires, electric motors, etc., shall be of the AC3 utilisation category. For resistive loads, contactors with AC1 utilisation category can be used, unless otherwise specified.

37.3.7.4 **Type 2 co-ordination shall be used for the selection of contactors.**

37.3.7.5 The contactor rating shall be in accordance with the specified value of the circuit in accordance with SANS 60947-4-1 and with an utilisation category of AC 3.

37.3.7.6 The contactor shall withstand the maximum fault level current of the circuit.

37.3.7.7 Noisy contactors shall not be acceptable.

37.3.7.8 Contactors with permanently installed auxiliary contacts shall be provided with an additional 1 x N/O and 1 x N/C contact above the numbers specified for control purposes and services.

37.3.7.9 The operating voltage of the coil of the contactor shall be as specified on the single line diagrams, and shall be continuously rated.

37.3.7.10 All contactors shall be of a standard product of a single manufacturer, unless otherwise specified.

37.3.8 Motor Starters

37.3.8.1 All motor starters shall comply with SANS 60947-4-1.

37.3.8.2 Motor starters can be the conventional circuit breaker, contactor & overload configuration or manual motor starter with integrated overload and contactor configuration.

37.3.8.3 Motor starters shall have all the remote controls and indicators as specified or indicated on the single line diagrams, but as a minimum it shall have the following:

- Phase failure protection
- Auto/Off/Manual selector switch (unless otherwise specified) with auxiliary contacts for remote monitoring
- On Auto selection it shall have a remote start contact
- On the Manual it shall active the contactor directly
- Overload indication (Red LED indicator lamp)
- Motor running (Green LED indicator lamp)
- Contacts for remote status monitoring

37.3.8.4 Type 2 coordination shall be used for selection of equipment.

37.3.8.5 Adjustable thermal overload release and instantaneous trip units shall be supplied on the overload devices, and the overload devices shall not operate under starting conditions,

38 INSTRUMENTATION, METERING AND CONTROL

38.1 TIMERS

38.1.1 Time switches shall be of the single pole type and suitable for 230V installations. The contact rating shall be suitable for the specified service, but shall be 15 Amp minimum. Contacts shall be manufactured of high quality material, such as silver plated or solid silver.

38.1.2 The time piece shall be driven by a selfstarting synchrone hysteresis motor and shall be provided with a minimum spring reserve of 72 hours and shall be wound up electrically. The main spring shall be kept fully wound up, but a slip clutch shall not be used and shall be completely reloaded within 15 minutes after power is restored.

38.1.3 The time switch shall be provided with weekend switching.

38.1.4 The switch shall be provided with a moulded plastic or metal casing with a plastic face plate and moulded plastic or metal base for Din rail mounting, or to clip-in on circuit breaker rail.

38.1.5 The time switch shall be provided with a manual operated by-pass switch.

38.2 PUSH BUTTONS AND APPARATUS

38.2.1 Push buttons and apparatus shall be provided from the standard range of one manufacturer. All push buttons shall have the same physical dimensions and shall be as far as possible inter-changeable with indicator lamps, key switches, etc.

38.2.2 The push buttons shall be designed for a long service life and the movement shall be of the mechanical type with spring loaded contacts and coupling or catch type.

38.2.3 All pushbuttons shall have replaceable lenses suitable for a variety of symbols. Name plates shall be of the inter-changeable type.

38.2.4 All terminals shall be suitable for the conductor sizes as used. Exposed push buttons shall be of the complete enclosed type. For low voltage and currents contacts with wiping action shall be used, and of the catch contact type for higher currents and voltages.

38.2.5 Illuminated push buttons shall be provided with LED lamps. Lamp voltages shall adapt the control voltage, but the control voltage shall be of a lower value as the lamp voltage. Push buttons shall be in accordance with the applicable requirements of SANS 60947-5-1.

38.2.6 The following colours shall be used for the push buttons:

- Red - Stop or emergency stop
- Green - Start (preparation/working)
- Yellow - Disrupt a function (action)
- White - Any function not covered in the above

38.2.7 Other applicable colours for special functions shall have to be approved by the engineer.

38.3 INDICATOR LIGHTS

38.3.1 The indicator lights shall be of the incandescent, neon or LED type lamps. The lamp voltages shall adapt the control voltage, but the control voltage shall be of a lower value as the lamp voltage.

38.3.2 The indicator lights shall be in accordance with SANS 60947-5-1 where applicable.

38.3.3 Indicator lights shall be suitable for mounting in distribution board panels and doors and shall consist of a mounting pedestal with lamp holder, an interchangeable lens, terminals and facilities for the installation.

38.3.4 Lamps shall be replaceable from the front of the panels without the use of any tools. All indicator lights shall be of the same standard range of one manufacturer, and shall have the same physical dimensions and be interchangeable with key switches and push buttons.

38.3.5 The following colours shall be used for indicator lights.

- Red - Abnormal condition (alarm)
- Yellow or Orange - Attention (careful)
- Green - Safe (In action)
- White or Clear - Circuit alive (or normal)
- Blue - Any other function not covered in the above.

38.3.6 Other applicable colours for special function have to be approved by the engineer.

38.4 METERS

38.4.1 Analogue Voltmeters

- Voltmeters shall be of the moving iron flush mounting type, with Class 1,5 accuracy as specified in IEC 60051-1 locally manufactured with 96 mm square flush panel mounting and fitted with unbreakable macrolon glass fronts. The voltmeters shall be suitable for operation on a 50 Hertz system. The voltmeters shall be manufactured in accordance with BS 89 to industrial grade accuracy as specified therein.
- The voltmeters shall be protected by high rupturing capacity cartridge fuses to SANS 60269-1 & 2 housed in suitable insulated fuse carriers with a panel-mounting base. Voltmeter selector switches shall be provided and shall have an off- and 6 metering positions, between the phases and between each phase and neutral.

38.4.2 Analogue Ammeters

- The ammeters shall comply with IEC 60051-1.
- The instruments shall be flush panel mounting, locally manufactured with 96 mm square face match the voltmeters and fitted with unbreakable macrolon glass fronts.
- The ammeter shall be of a moving iron type showing the instantaneous current value, combined with a maximum ammeter employing a bimetallic spiral device which will indicate the mean current value over a 15 minute period, fitted with a residual pointer to indicate the maximum mean current reached during any period between manual resetting.
- The bimetallic system shall incorporate ambient temperature compensation.

38.4.3 Voltmeter Selector Switches

- Unless otherwise specified each distribution board shall be provided with one voltmeter and selector switch.
- The voltmeter selector switch shall have an "OFF" position and six measuring positions for all phase/neutral and phase to phase readings.
- The switch shall be of the rotary type with CAM or WHIPE action air break contacts with two openings per pole.
- The positions shall be clearly and accurately indicated on the faceplate in relation to the handle position.
- The selector shall be suitable for flush mounting.

38.4.4 Voltmeter Fuses

- The voltmeter fuses shall be of the cartridge type with fuse carrier and fuse base with terminals. The fuse shall only be removable after drawing out of the fuse carrier and to remove the cartridge from the carrier. Rewireable fuses shall not be acceptable. The fuse holder base shall be designed and manufactured for flush mounting and shall be installed on the same panel with selector switch and the voltmeter.

38.4.5 Current Transformers

- Current transformers shall be of the ring type and shall be neatly installed. The area for the conductor shall be just big enough for installation to prevent inaccuracy. The current transformers shall be designed for the specified primary current with a 5 Amp secondary current.
- The current transformer rating shall be designed to take the instrument load to prevent any misreading.
- For indicating instruments the accuracy shall be Class 5. For measuring purposes the accuracy up to 200A shall be Class 1, from 250 to 600 A Class 0,5 and from 800A up shall be Class 0,2. Safety Class shall be 5 P or 10 P as applicable.

- All current transformers shall be provided with labels with non-removable lettering, indicating:
  - Manufacturer
  - Series number and type
  - Primary and secondary currents
  - Frequency
  - Rating and accuracy class
  - Highest Installation voltage
  - Insulation provision
- The current transformers shall be designed to accept the dynamic powers of the specified fault level.

38.5.6 Energy Meters

- Energy meters shall comply with SANS1799, SANS62053-11
- The meters shall have the following minimum requirements:

DESCRIPTION	MINIMUM REQUIREMENT
Voltage measurements input for direct connections	120 to 480V
Current for direct connections	5 to 50A
Current though current transformers	1, 2 & 5A
Measurement frequencies	50Hz ±10%
Accuracy class	Class 1
Operating temperature	-25°C to 55°C
Output	• Instantaneous values for: Current, Voltage, Power Factor, Frequency • Active, reactive and apparent energy
Memory	Meters shall have on board memory to provide demand log, daily, weekly and monthly usage log (only if specified)
Communication	Modbus via RS485

39 CONDUITS AND ACCESSORIES

39.1 TYPES OF CONDUIT

39.1.1 SCREWED METAL CONDUITS

- Screwed steel conduits shall be of the welded or solid drawn heavy gauge tubing, in accordance with SANS 1065-1 and SANS 1065-2 and shall bear the SABS mark. The finish shall be black enamel or hot dip galvanised in accordance with SANS EN 10240

39.1.2 OTHER METAL CONDUIT SYSTEMS

- Alternatively, other steel conduit systems may be used where the local authority permits. The conduit shall be of minimum 0.9 mm thickness and shall comply with SANS 1065-1 and SANS 1065-2
- . The finish shall be black enamel or hot dip galvanised in accordance with SANS EN 10240.
- These types of conduits and accessories shall not be used for the suspension of loads such as light fittings. These types of conduit installations shall not be used for flameproof installations.
- Screwless metallic conduit shall not be used without the Engineers approval. The whole system shall be the product of one manufacturer.

39.1.3 NON METALLIC CONDUIT

- Non metallic conduit shall not be used unless approved by the Local Authority and approved in writing by the Engineer. Non metallic conduit shall comply with SANS 950 and installation shall comply with Appendix C of SANS 950 and with the requirements of the Local Authority.
- Light fittings etc., shall not be supported from non metallic conduit or boxes but shall be fixed to the surrounding structure.
- Plastic conduit shall be rigid, heavy gauge PVC, bearing the SABS mark. During construction precaution shall be taken to prevent mechanical damage to plastic conduit.
- Where plastic boxes are used as outlets for light fittings, the special devices provided by the manufacturer to eliminate heat conductance to the box shall be provided.
- Plastic conduit shall be assembled with the solvent adhesive supplied by the manufacturer. The manufacturers instructions must be closely followed.

39.1.4 FLEXIBLE CONDUIT

- Flexible conduit shall comply with SABS IEC 60614–2-5 and shall be used in accordance with Clause 6.5.4 of SANS 10142-1. Flexible conduit shall comprise galvanised metallic conduit. PVC sheathed galvanised metal conduit or metal reinforced PVC conduit (Anaconda Sealitite), shall be used in damp or humid areas.
- Flexible conduit shall be used for connection to moveable equipment to enable adjustment during normal operation and for the connection of motors, any other vibrating equipment, connection of thermostats, sensors on equipment and for stove and geyser connections.
- Flexible conduit shall be connected to the remainder of the installation by means of a draw box

39.1.5 GALVANISED CONDUIT SHALL BE USED:

a) Where installed in positions exposed to the weather or in moist surroundings.
b) For installations within 30 km of the coast.
c) Where required by the Local Authority.
d) Where the conduit is in contact with the soil.
e) At ends intended for future extension.

39.1.6 MINIMUM CONDUIT SIZE

- All conduits shall have a minimum of 20 mm diameter.

39.1.7 BOLTS, SCREWS AND NUTS

- Only steel lock nuts of thick gauge with milled sides shall be used. Cadmium plated bolts and nuts shall be used. Where installation is exposed to the weather brass bolts and nuts shall be used.

39.1.8 CONDUIT TERMINATIONS

- Conduits shall be terminated by means of a brass bush and two lock nuts. The conduit end shall only project far enough through the hole to accommodate the bush and lock nut.

39.1.9 JOINTS

- Only approved couplings shall be used. All conduit ends shall be reamed and all joints tightly screwed, locknuts shall be provided to ensure a mechanically strong joint and electrical continuity.
- All joints shall be treated again to prevent them from rusting in damp areas, coastal areas and where the installation is exposed to the weather for any length of time.

39.1.10 CONTINUITY

- Earth continuity shall be maintained throughout the complete installation.

40 INSTALLATION OF CONDUITS (GENERAL)

40.1 POSITIONING OF OUTLETS

40.1.1 All outlets, etc. shall be accurately positioned. It is the Contractor's responsibility to ensure that all accessories are installed level, square at the correct height and depth behind plaster. The maximum depth from wall surface to the outlet box shall be 15 mm.

40.2 DRAW WIRES

40.2.1 Galvanised steel draw wires shall be installed in all unwired conduits, e.g. spare conduits, telephone, intercom or other installation services.

40.3 BENDS AND DRAW BOXES

40.3.1 Pre-fabricated bends or elbows will not be allowed except where specially approved. All bends shall have a radius of at least five times the outside diameter of the conduit. Conduit showing signs of flattening or cracking shall be rejected.

40.3.2 Draw boxes shall be installed at maximum 15 m intervals for straight conduit runs 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 surfaces are finished in panelling, in which case a door to match the panelling shall be provided at the expense of the Electrical Contractor.

40.3.3 Inspection elbows, solid bends and tees shall not be used.

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

40.3.5 Positions of all draw boxes shall be indicated on the "As Built" drawings.

40.4 REAMING

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

40.5 WALL BOXES

40.5.1 Wall boxes for socket outlets, isolators, switches, etc., shall be of the heavy gauge pressed steel galvanised type, provided with substantial lugs, and shall be drilled and tapped for fixing screws.

40.5.2 Knockout conduit entry holes shall be provided at the back and the sides.

40.5.3 Fittings shall be provided with gaskets or machined watertight covers when used externally or in damp situations.

40.5.4 Deep boxes shall be used for cast-in conduit work where these are required by structural considerations. Wall boxes shall be installed at a maximum depth of 15 mm behind wall surfaces.

40.5.5 Where accessories are fixed directly to tapped holes in conduit boxes, the boxes shall be fixed independently of the conduit system.

41 INSTALLATION IN CEILING VOIDS

41.1 Conduits fixed in voids over suspended ceilings shall be rigidly supported from the structural ceiling.

41.2 Conduits fixed in roof voids shall be fixed square with structural beams or parallel.

41.3 Conduit shall not be installed within 150 mm of hot or chilled water pipes and shall run below the former.

41.4 All draw boxes and outlet boxes for future equipment shall be covered with suitable standard blank covers or as specified.

42 INSTALLATION IN CONCRETE

42.1 The Contractor shall ensure that all conduits and accessories, which are to be cast into concrete are placed in their correct positions in good time to avoid any delays to the builders programme. Once the installation has been completed, the Contractor shall advise the Engineer in order that the installation may be inspected by the Engineer before the concrete is to be cast. The Electrical Contractor or his representative shall be present when the concrete is cast to ensure that no damage or displacement to conduit occurs.

42.2 Parallel running conduits shall be sufficiently spaced so that the structural strength of beams slabs etc., is not affected.

42.3 All conduits, outlet boxes, draw boxes etc., shall be securely fixed to the shuttering to prevent displacement when concrete is cast. Wire shall not be used for securing boxes to the shuttering where off-shutter finishes are required.

42.4 Where conduits are installed in screeds, the top of the conduit shall be at least 30 mm below the surface of the screed. A minimum distance of twice the outside diameter of the conduit shall be left free between adjoining conduits. Conduits shall be secured to the concrete slab at intervals not exceeding 2,0 metres.

42.5 Where possible, conduits shall not be installed across expansion joints. If this cannot be avoided a conduit expansion joint as approved by the Engineer must be installed. Earth continuity must be maintained through all expansion joints.

42.6 Where a number of conduits are installed in parallel they shall cross the expansion joint of the structure via a single draw box. A number of draw boxes adjacent to each other will not be allowed.

43 INSTALLATION INTO BRICKWORK

43.1 Conduits and outlet boxes etc., to be built in shall be supplied and fixed in the correct position by the Electrical Contractor in accordance with the programme of the builder. As far as possible the chasing in of conduits should be avoided.

43.2 Chases shall be made deep enough to ensure that the conduits are at least 20 mm below the finished plaster surface.

43.3 All chases shall be carried out by means of chasing machines.

43.4 Where the Contractor is responsible for the chasing and building-in of conduits or other equipment, he will be responsible for all damage as a result of this work and will be required to made good at his own cost.

43.5 Under no circumstances shall concrete structures, face brick walls or finished surfaces be chased or cut without the written permission of the Engineer or Architect.

43.6 Where outlets are installed into face brick walls an extension box shall be provided in front of the outlet box. This extension box shall be flush with the face of the wall.

44 CHANNELS, CABLE TRAYS AND LADDERS

44.1. GENERAL

44.1.1 Wiring channels shall be of "O-Line" or "Electroduct" type or approved equivalent. It shall be manufactured of hot dip galvanised rolled steel.

44.1.2 Wiring cable trays and ladders shall comply with SANS 763 with respect of finishes. PVC trays shall be rigid unplasticised.

44.1.3 The Contractor shall supply and install all wiring channels, cable trays and/or ladders as specified or as required including the necessary supports, clamps, hangers, fixing materials, bends angles, junctions, reducers, T-pieces etc. He shall further liaise with the Main Contractor for the provision of holes and access. All wiring channels, cable trays or ladders shall be properly earthed.

44.2 SUPPORTS

44.2.1 Trays and ladders shall be supported at the following maximum intervals:

- 1,6 mm thick metal trays with 12 mm return - 1m spacing
- Metal trays with folded over return and 50 mm upstand - 1,22m spacing
- 2,4mm thick metal trays, and 75mm return - 1,5m spacing
- Metal cable ladders - 1,5m spacing
- 3,0 mm thick PVC trays with 40 mm return - 1,0m spacing
- 4,0 mm thick PVC trays with 60 mm return - 1,5m spacing

44.2.2 In addition trays and ladders shall be supported at each bend, offset and T-Junction. The above spacing of supports is applicable to both vertical and horizontal installation of trays and ladders.

45 2 WIRING CHANNELS

45.1 JOINTS

45.1.1 All joints shall be aligned and secured by means of standard connection pieces that are pop-riveted to both adjoining sections. Adjoining sections shall butt tightly. Covers shall fit tightly across the joint. All joints/terminations shall be made electrically continuous.

45.2 EXPANSION JOINTS

45.2.1 Where channels cross expansion joints suitable expansion joints shall be provided in the channels by means of fish plates pop-riveted to the channel on one side of the expansion joint and floating freely in the channel on the other side of the expansion joint. Such expansion joints shall be made electrically continuous by installing a coiled conductor of suitable size across the joint.

45.3 SUPPORT FOR CONDUCTORS

45.3.1 All conductors in inverted cable channels shall be retained by means of standard clips or spacer bars at approximately 1m centres.

45.4 FINISHES

45.4.1 Burrs and sharp edges shall be removed and the inside edges of all joints shall be lined with rubber protective lining or other suitable rubberised or plastic compound to prevent laceration of the conductor insulation.

45.4.2 All holes through, which conductors pass shall be fitted with grommets.

45.5 VERMIN PROOFING

45.5.1 All wireways shall be made vermin proof. Holes shall be covered by means of screwed metal plugs or by means of metal strips that are pop-riveted to the channel.

45.6 COVER PLATES

45.6.1 Where possible the suppliers' standard metal or PVC cover plates shall be used. All cover plates shall be neatly and securely fitted.

45.6.2 Steel cover plate finishes shall be the same as for the channels.

45.7 WIRING CHANNEL CAPACITIES

45.7.1 The overall cross sectional areas of all conductors, including insulation, shall not exceed 45% of the total internal cross sectional area of the trunking whilst in the case of ducting, this figure shall be 40%.

45.8 FIXING OF CHANNELS

45.8.1 The Contractor shall supply and install all hangers, supports or fixings as required for the channels. Channels shall be supported at maximum intervals of 1,5m or as otherwise specified. Channel runs shall be carefully planned to avoid clashes with other services and to ensure that all covers can be removed after completion of the entire installation. Standard clamps, hangers etc. shall be used as required. Where it is not possible to support the channels at the specified intervals, they shall be supported in a sound manner to the satisfaction of the Engineer.

45.9 INSTALLATION IN CONCRETE

45.9.1 Channels shall be filled with suitable fillers to prevent the ingress of cement and shall be securely fixed in position to the shuttering.

45.10 ACCESSORIES

45.10.1 All accessories i.e. hangers, cover brackets, etc. shall be standard items and in general have the same finish as the channels.

45.10.2 Purpose made accessories shall not be acceptable.

46 CABLE TRAYS AND LADDERS

46.1 JOINTS

46.1.1 Joints shall be made smooth without rough edges etc., that may damage the cable. Joints shall as far as possible be arranged to occur at supports. Where joints do not coincide with supports, joints shall be made by means of wrap-around pieces of the same thickness of the tray and at least 200mm long. The two cable tray ends shall butt tightly in the centre of the splice, the splice shall be bolted to each cable tray by means of at least 4 round head bolts, nuts and washers on each side of the joint. Splices with the same finish as the tray shall be provided at joints which do coincide with supports.

46.2 EXPANSION JOINTS

46.2.1 Where cable trays or ladders cross expansion joints, the trays or ladders must form a gap of at least 25 mm between the two sections. Cables installed across expansion joints, must have enough slack to accommodate the expansion of the building.

46.3 EARTHING

46.3.1 Bare copper conductors or straps of sufficient length to accommodate expansion and contraction shall be installed across all expansion joints, also to joints where continuity cannot be guaranteed. These additional conductors shall always be installed in outdoor conditions or coastal regions.

46.4 FIXING

46.4.1 Trays and cable ladders shall be bolted to supports by at least two bolts per support.

46.4.2 It is the responsibility of the Contractor to ensure that adequate fixing is provided and the manufacturer's instructions shall be strictly adhered to. Intervals between brackets above 1,5m shall not be acceptable. Cable trays and ladders that work loose shall be rectified at his own expense.

46.4.3 The fixing shall take into account conditions on site during installation.

47 SMALL WIRING AND WIRING ACCESSORIES

47.1. WIRING

47.1 CONDUCTORS

47.1.1 Except where otherwise specified all wiring shall be carried out with PVC insulated, stranded copper conductors and bare stranded copper earth wires, complying with SANS 1507 and the installation shall comply with SANS 10142-1 as amended.

- All wiring shall be installed in conduit, trunking or ducting as specified. Open wiring will not be accepted.

47.1.3 The wiring of any circuit shall only be carried out after the whole of the conduit installation for that particular circuit has been installed and fixed in position. No wires shall be drawn through before the conduit has been thoroughly cleaned of all debris and moisture and that the building work is at a stage that there is no likelihood of the ingress of dirt and moisture.

- It should also be possible for wires to be drawn through the completed conduit installation without any undue strain.
- Wires drawn into conduits etc., shall be of sufficient length to allow the connection of fittings, appliances, etc.

47.1.6 As a minimum, light circuits shall be wired with 2,5mm^2 and plug circuits with 4 mm^2 conductors, except as otherwise specified.

47.1.7 Wiring shall be sized to carry the load of the circuit as shown plus an allowance of 10% for future connections and in accordance with the overall voltage drop requirements of the Wiring Regulations. The same allowance shall be made when determining the wiring capacity of each conduit run. Attention is drawn to the application of grouping factors to the rating of wires in conduit and trunking.

47.1.8 All conductors shall be colour coded to facilitate identification of the circuit and switch wiring, black for neutral conductors only and green for insulated earth conductors. Three phase circuits shall be colour coded to identify phases.

47.1.9 All wiring shall be carried out by means of the loop-in system. Jointing of conductors shall not be permitted.

47.1.10 Where conductors of more than one circuit are installed in wireways, the conductors of each circuit shall be PVC taped together at intervals of one metre. Appropriate circuit grouping factors must be applied to prevent overheating. A common, unbroken suitable sized earth conductor may be installed into the wireways and crimped ferrule connections shall be used for subsidiary earth conductors to the various outlets.

47.1.11 With the exception of three phase outlets, circuits of different phases shall not be drawn into the same switch or outlet boxes.

47.1.12 In order to support the mass of the conductors installed in vertical wireways these conductors shall be secured at intervals not exceeding 5m by means of suitable clamps.

47.1.13 The end strands of all wires, whether single or looped, to be connected to the connection terminals of light fittings or any equipment are to be tightly twisted together. There shall be no cutting away of wire strands.

- Protective edge strips shall be provided to avoid damage to conductor insulation when drawn into wiring trunking etc. The Engineer shall reject any conductor with such damage. These conductors shall then be replaced at the contractor's own expense.

1.2 COPPER BRAIDED CABLE

47.2.1 Except where otherwise specified, all copper braided cable shall consist of PVC insulated copper conductors size and number of cores as specified. The total conductor area of the braiding shall be as specified in SANS 150-1970 clause 11.7.

- Both the PVC insulated copper conductors and the copper braiding shall comply with the applicable SABS regulations.
- Installation of copper braided cables shall be carried out in accordance with SANS 10142-1 as amended.

47.2.4 In roof spaces and ceiling voids, where the cables are unlikely to be disturbed, the cables need not be secured. However, the cables shall be neatly grouped together, saddled and strapped as far as possible.

- All wiring from the roof space etc. to wall mounted outlet boxes shall be installed in a suitably sized conduits.

47.2.6 Where copper braided cable enters powerskirting etc. the cable will be connected to the first outlet on the circuit, the remaining outlets in the powerskirting etc. shall be connected using PVC insulated conductors and copper earth conductor, or as otherwise specified.

- It should also be possible for cables to be drawn through the completed conduit installation without any undue strain.

47.2.8 Copper braided cables drawn into conduits etc., shall be of sufficient length to allow the connection of fittings, appliances, etc.

47.2.9 As a minimum, copper braided cable conductor sizes for light circuits shall be 1,5mm^2 and plug circuits 2,5 mm^2, except as otherwise specified.

47.2.10 Conductors shall be sized to carry the load of the circuit as shown plus an allowance of 10% for future connections and in accordance with the overall voltage drop requirements of the Wiring Regulations. Attention is drawn to the application of grouping factors to the rating of copper braided cables in trunking, and the size of the circuit breaker feeding the circuit.

47.2.11 All conductors of a copper braided cable shall be colour coded to facilitate identification of the circuit, red for live and black for neutral conductors only and green for insulated earth conductors. Three phase circuits shall be colour coded to identify phases.

- All wiring shall be carried out by means of the loop-in system. Jointing of cables shall not be permitted.

In order to support the mass of copper braided cables installed in vertical wireways these conductors shall be secured at intervals not exceeding 5m by means of suitable clamps.

The end strands of all conductors, whether single or looped, to be connected to the connection terminals of light fittings or any equipment are to be tightly twisted together. There shall be no cutting away of wire strands.

47.2.13 Protective edge strips shall be provided at openings and mitre joints to avoid damage to braiding and conductor insulation when drawn into wiring trunking etc. The Engineer shall reject any copper braided cable with such damage. These copper braided cables shall then be replaced at the contractor's own expense.

47.2.14 Properly sized gripper glands to suit the cables shall be used where the braided cable enters terminal boxes, outlet boxes, distribution boards, light fittings etc.

48 TRENCHES AND EXCAVATIONS

48.1 The following shall be in the classification of the materials to be excavated.

- Material Class "C" shall comprise granite, chert, quartzitic sandstone, slate and rock of similar or greater hardness in undecomposed boulders exceeding 0,15m³ in volume, the practical excavation of which, in the opinion of the Engineer, would normally necessitate the use of explosives.

- Material Class "B" shall comprise hard material other than that classified as Class "C" above, the economic excavation of which, in the opinion of the Engineer, warrants the use of pneumatic tools or mechanical breakers and shall include hard shale, compact ouklip and rock of similar hardness.

- Material Class "A" shall comprise all materials to be excavated other than those classified as Class "B" or Class "C" above and shall include made-up ground, rubbish, gravel, sand, shale and clay.

48.2 All items of drains, manholes and pipe excavations, etc. are measured as being in Class "A" material unless otherwise described.

48.3 If the contractor considers that any of the excavation encountered is in Class "B" or "C" material he shall immediately notify the Engineer and/or the Quantity Surveyor for a ruling; failing such notification the excavations shall be deemed to be in Class "A" material and shall be valued accordingly.

48.4 The contractor shall notify the Quantity Surveyor when the excavations, or parts thereof, are completed and before any filling is done, in order that all necessary site measurements may be taken.

48.5 The contractor shall notify the Engineer when the excavations, or parts thereof, are completed and ready to receive constructions. No work shall be built until the excavations have been approved.

48.6 Should any ground fall in (other than that required to be excavated) owing to omission or inadequacy of support or to any act, neglect or carelessness of the Subcontractor, such ground will not be paid for as excavations but it shall be dug out and deposited on the site (or carted away) and returned, refilled and rammed as directed and entirely at the contractor's expense.

48.7 No trench for any drain shall be excavated less than 530mm wide. The bottoms of trenches are to be well rammed and finished to regular and even falls, and the falls and the barrel of the pipes shall rest on solid ground and holes shall be cut around joints of sufficient size to enable the jointing and filleting to be properly performed.

48.8 All hollows, unnecessary excavations below pipes, soft and loose places or uneven bottoming in rock cutting are to be cleared out and filled in with cement concrete Class "15". Carefully fill in and pack around with soil for 600mm above pipes. Fill in and ram well the remainder of the trench in 230mm layers up to ground level. The contractor shall provide all necessary sight rails, boning rods, open or close planking and strutting, staging, etc.

48.9 The contractor shall ensure that the trenches are maintained in a safe condition at all times.

49 LABELLING

49.1 The following shall be included as part of the labelling installation, further to the requirements given in SANS.

49.2 The contractor shall provide labelling on all valves, equipment, piping and accessories and shall comprise descriptions, colour bands and flow directions, all of which are to be labelled as per specification.

49.3 WET SERVICES EQUIPMENT (PLANT ROOMS)

- The contractor shall provide labelling on all equipment within the plant room as approved by the wet services engineer.
- Labels shall be white traffolyte material, with the lettering engraved in black, indicating location and water flow direction of valves.
- Traffolyte tags shall have a thickness of 1.5mm and a height of 35mm, with a length suitable to the description.
- Lettering shall suit the size of the tag and label description.
- Traffolyte tags shall be attached to pipe accessories within the plant room using a 40mm diameter split ring/key ring.
- Labelling of the traffolyte material shall be limited to the plant room, with the exception of hospital main water reticulation fittings (section 30.2).

49.3 PIPE ACCESSORIES (VALVES ETC.)

- Labelling of the traffolyte material shall be used for hospital main water reticulation fittings.
- Traffolyte tags shall be mounted to the ceiling tee strip, as illustrated in Figure 1 below, with double sided tape of the Automotive 3M type.
- Traffolyte tags shall have a width of 20mm and a length of 185mm (length may be increased if deemed necessary and approved by the Engineer).
- All pipe accessories outside of the plant room, baring hospital main reticulation fittings, shall have a label of self-adhesive, polyvinyl material placed on the pipe next to the handle, upstream of the valve. The label shall stipulate "N/O" or "N/C" to indicate 'normally open' or 'normally closed,' respectively. The label shall have black text on a white background. Refer to piping section for sizing specification (section 30.3).

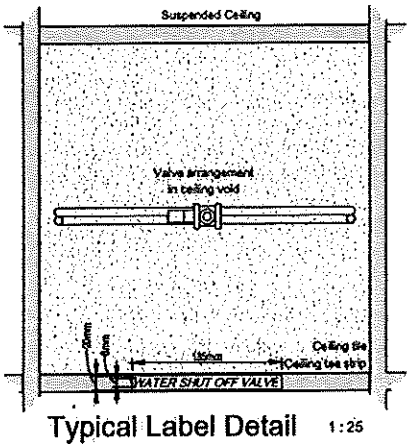


Figure 1: Mounted label on ceiling tee strip with dimensions included.

49.4 PIPING

- All pipes, including cladding and/or insulation, shall be labelled with description/identification labels, directional arrow labels indicating flow direction and shall be colour coded with colour bands in accordance with Table A or as alternatively specified and approved by the Engineer.
- Labels shall be provided to piping at – valve locations, inside plumbing shafts, at points where piping enters or leaves partitions, walls, floors or ceilings and at least at every 10m centres of straight runs
- Description/Identification labels and directional arrows to be a self-adhesive, polyvinyl material. All external labels to be weather-proof and UV resistant.
- Description/Identification label and directional arrows to be black text on a white background.
- Labels on piping of diameter larger than 50mm shall be 150x50mm in size with lettering as illustrated in Figure 2 below. (Label may extend to 2x lines if necessary and approved by the Engineer). Directional arrows shall follow the same dimensional boundaries with the arrow suitably fitted to the label. Colour band shall be 200mm in width.

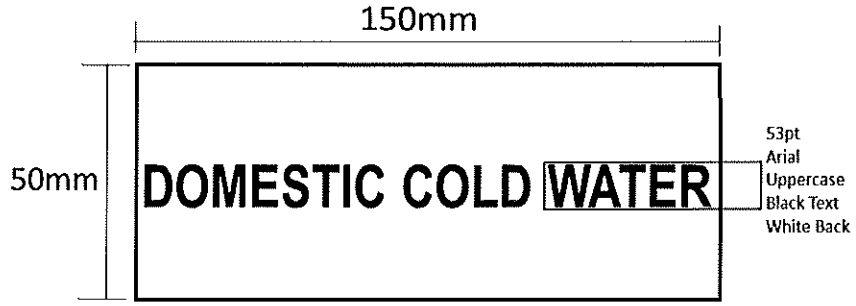


Figure 2: Piping, diameter >50mm, label specification

- Labels on piping diameter 50mm or smaller shall be 70x25mm in size with lettering as illustrated in Figure 3 below.
- (Label may extend to 2x lines if necessary and approved by the Engineer). Directional arrows shall follow the same dimensional boundaries with the arrow suitably fitted to the label. Colour band shall be 50mm in width.

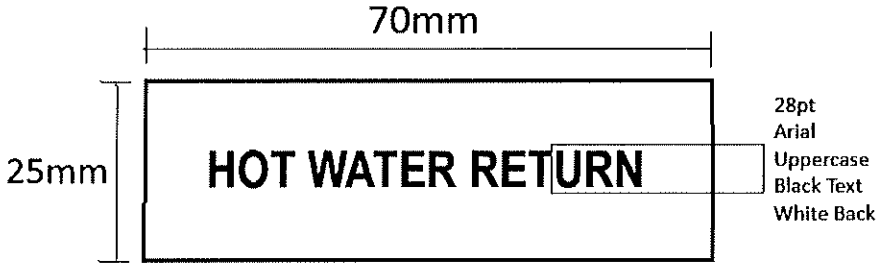


Figure 3: Piping, diameter equal to or smaller than 50mm, label specification

- All exposed pipes within the plantroom shall be painted to the required colour specified by the architect.
- Cladding shall be painted as previously specified for pipes with the relevant code for the fluid/gas being transported as per SANS 10140-3.
- All colour coding of piping shall follow the specification below. All colours are referenced to RAL, which is a universal colour formula. Colours will vary when viewing from different devices (screen resolution), therefore RAL colours are used as a guide/reference. All printers and paint manufacturers will be able to do necessary calculations to match the nearest/closest colour from the RAL breakdown.

Table A: Colour coding of pipelines guided by standards outlined in SANS 10140-3 and ISO 14726

CONTENTS OF PIPELINE (basic nature of water)	1. Basic Identifier Colour	Standards
Water Drinkable/Domestic:		
Domestic Cold Water	Light Blue (RAL 5012)	
Domestic Hot Water	Dark Red (RAL 3002)	SANS-10140
Hot Water Return	Orange (RAL 2004)	SANS-10140
Water Non-drinkable:		
Fire-fighting water	Traffic red (RAL 3020)	SANS-10140
Fire-fighting water-foam line	Light Ivory RAL1015	SANS-10140
Industrial water	Pearl Opel Green (RAL 6036)	SANS-10140
Demineralized	White (RAL 9003)	SANS-10140
-Sanitary drainage:		
Soil drainage	Black (RAL 9005)	ISO-14726
Waste water drainage	Brown (RAL 8017)	-
Grey water	Brimstone yellow (RAL 1016)	ISO-14726
Black water	Lavender (RAL 4005)	ISO-14726
AC Condensate drainage	Turquoise (RAL 5018)	-
Grease trap drainage	Light Brown (RAL 1011)	-
Macerator drainage	Nut brown (RAL 8023)	-
-Water (Supplementary):		
Irrigation supply	Yellow Green (RAL 6018)	-
RO water	Signal Grey (RAL 6094)	-
Rainwater	Violet (RAL 4007)	-
Treated water	Soft Pink (RAL 3015)	-
Borehole water	Cobalt Blue (RAL 5005)	-

KWAZULU-NATAL PROVINCE
PUBLIC WORKS
REPUBLIC OF SOUTH AFRICA

DPW: ST. ANDREWS HOSPITAL: ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORK

ANNEXURE 19

GENERAL SPECIFICATIONS - REPLACEMENT OF TIMBER PURLINS

public works
Department:
Public Works
REPUBLIC OF SOUTH AFRICA

MAP AFRICA
CONSULTING

A. METAL ROOF SHEETING

1. Sheeting specification as per Architect's details, supplied in single lengths fixed onto Grade 5 Type SA Pine timber purlins with the 'h' dimension placed vertically. Note : Purlin spacing should not exceed 900mm centres. The use of purlin are as follows :

a. 76 x 50 Grade 5 Type SA Pine timber purlins are only acceptable when truss/rafter spacings do not exceed 1200mm centres.
b. 114 x 50 Grade 5 Type SA Pine timber purlins are only acceptable when truss/rafter spacing is between 1200mm to 1700mm centres.
c. 150 x 50 Grade 5 Type SA Pine timber purlins are only acceptable when truss/rafter spacing is between 1700mm to 2000mm centres.

Colour of the new sheeting to match the roof sheeting on existing blocks or otherwise directed by project Architect.

PROJECT	DETAILS	DATE	REVISION
ST. ANDREWS HOSPITAL ASBESTOS ERADICATION AND ASSOCIATED ROOFING WORKS	GENERAL SPECIFICATIONS: REPLACEMENT OF THE TIMBER PURLINS	2023.11.16	P1
		PROJECT No. 545	SKETCH No. SK 01