



THE REVOLUTIONARY GOVERNMENT OF ZANZIBAR
MINISTRY OF EDUCATION AND VOCATIONAL TRAINING
ZANZIBAR

CONTRACT

FOR

PROPOSED NEW CONSTRUCTION OF MWANAKWEREKWE
PRIMARY SCHOOL (G+2) AT URBAN WEST REGION IN UNGUJA

ADDENDUM No. 1

FOR

CHANGING OF NAME / AMENDMENT OF THE NAME

BETWEEN

PRINCIPAL SECRETARY,
MINISTRY OF EDUCATION AND VOCATIONAL TRAINING,
P.O.BOX 394,
ZANZIBAR.

AND

M/S ESTIM ENTERPRISES LIMITED

P.O. BOX 19716 ZANZIBAR

CONTRACT NO. SMZ/IME/CW 02/2021-2022

MARCH, 2022

ADDENDUM CONTRACT No. 1

PROPOSED NEW CONSTRUCTION OF MWANAKWEREKWE PRIMARY
SCHOOL (G+2) AT URBAN WEST REGION IN UNGUJA

This SUPPLEMENTARY CONTRACT (hereinafter with all Appendices attached hereto and forming an integral part hereof, called "Addendum No. 1" is made theday of the month of2022, between on the one hand, the Principal Secretary, Ministry of Education and Vocational Training - Zanzibar (MoEVT), (hereinafter called the "Employer"), and on the other hand, M/S ESTIM ENTERPRISES LIMITED instead of M/S ESTIM CONSTRUCTION COMPANY LIMITED (hereinafter called the "Contractor")

AND WHEREAS,

The Employer and the Contractor had entered into a Contract dated January, 2022, terms of the Contract are stated herein (hereinafter called the "Contract") for the PROPOSED NEW CONSTRUCTION OF MWANAKWEREKWE PRIMARY SCHOOL (G+2) AT URBAN WEST REGION IN UNGUJA

SMZ/IMF/CW02/2/2021-2022 for the PROPOSED NEW CONSTRUCTION OF MWANAKWEREKWE PRIMARY SCHOOL (G+2) AT URBAN WEST REGION IN UNGUJA (hereinafter called the "Project").

- a) Given the Government Notice on Compliance issued by the Hon. Minister of Trade and Industries Development on 21st day of September, 2021 and following the amendment of section 238 of the Company Act, No. 15 of 2015 by the enactment of section 29 of Finance Act No. 3 of 2021 restraining the issuance of Certificate of Compliance to Tanzania Mainland incorporated Companies which set a better procedure of incorporating such companies in Zanzibar, all Tanzania Mainland incorporated Companies are hereby to re-register for the Certificate of Incorporation in accordance with the provision of the Company Act.
- b) Regarding the said notice the existing Branch Office in Zanzibar named 'Estim Construction Company Limited' has been registered and incorporated as a Local Company in Zanzibar named 'Estim Enterprises Limited'

NOW THEREFORE the parties hereto here by agree as follows:

That, the contractor shall furnish the following documents which shall be deemed to form and be read and construed as part of this Addendum:

As

- (a) the Power of Attorney;
- (b) the Performance Guarantee;
- (c) the Registration Certificate of 'Estim Enterprises Ltd'; and
- (d) the Registered Board Resolution of Changing of Name.

That, the terms and conditions of the Contract signed on 5th day of May, 2022 shall be read and construed as part of this Addendum No. 1 save as they are expressly varied herein. In application of the foregoing the term "Contractor" within the context of the said Contract shall be read as "Addendum No. 1" unless the context otherwise requires.

That, the original contract amount is Tanzania Shillings Three Billion Seven Hundred Ninety Four Million Two Hundred Sixty Six Thousand Fifty One and Seventy Five Cents Only. (3,794,266,051.75) Including 15% VAT

IN WITNESS WHEREOF, the parties hereto have caused their respective seals to be hereunto affixed the day and year first above written.

For and behalf of MoEVT (Employer)

For and behalf of contractor

Name: ALI KHAMIS JUNA

Name: Parag Rahangdale

Address: Box 394 Zanz

Address: P.O. Box 1654, ZANZIBAR

Signature: [Signature]

Signature: [Signature]

Date: 5. 4. 2022

Date: 05/04/2022



ESTIM ENTERPRISES LIMITED
P.O. Box 1654
ZANZIBAR



THE REVOLUTIONARY GOVERNMENT OF ZANZIBAR
MINISTRY OF EDUCATION AND VOCATIONAL TRAINING

P.O. Box 394
ZANZIBAR-TANZANIA
Website: www.moez.go.tz

Tel: +255-24-2232728
Fax: +255-24-2233306
Email: info@moez.go.tz
pmu@moez.go.tz

Ref: P33/21/9/IMF/VOL.I/132

Date: 30th March, 2022

MANAGING DIRECTOR,
ESTIM ENTERPRISES LIMITED,
P.O.BOX 1654,
ZANZIBAR.



Dear Sir,

REF: PROPOSED NEW CONSTRUCTION OF MWANAKWEREKWE PRIMARY
SCHOOL (G+2) AT URBAN WEST REGION AND KWA BINTI HAMRANI PRIMARY
SCHOOL (G+2) AT URBAN WEST REGION IN UNGUJA

CONTRACT NO. SMZ/IMF/CW 02/2021-2022 AND SMZ/IMF CW 08/2021-2022

Sub: Re-Registration of our Branch as Local Company in Zanzibar in
Compliance with Amendment of section 238 of the Companies Act, 213.

References made to your letter dated on 17 January, 2022 with reference ECCL/22/1080/GP/dn
regarding to the above mentioned.

The Ministry of Education and Vocational Training acknowledges the existing name of your
company 'ESTIM ENTERPRISES LIMITED' THAT HAS BEEN CHANGED IN COMPLIANCE
WITH THE EXISTING Companies Act of 2013 which demands all foreign companies to be register
in Zanzibar as local companies.

Therefore, from now on ESTIM ENTERPRISES LIMITED will be considered as local company
and will indeed replace ESTIM CONSTRUCTION COMPANY LIMITED in the CONTRACT
NO. SMZ/IMF/CW 02/2021-2022 Mwanakwerekwe Primary School Urban West Region in Unguja
AND SMZ/IMF CW 08/2021-2022 Binti Hamrani Primary School.

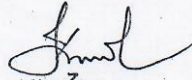
Direct lines to:

Minister 2238205, Principal Secretary 2238210, Deputy Principal Secretary 2234356

We thank you for the information and anticipate to work together as we always do.

Thank you.

Yours sincerely,



Ali Kh. Juma,
Principal Secretary
Ministry of Education and Vocational Training
Zanzibar.

CC:
REGISTRAR,
ZANZIBAR CONTRACTORS' REGISTRATION BOARD,
ZANZIBAR.

CC: PHYSICSL DEVELOPMENT DEVISION
MINISTRY OF EDUCATION AND VOCATIOANAL TRAINING
ZANZIBAR.

Direct lines to:

Minister 2238205, Principal Secretary 2238210, Deputy Principal Secretary 2234356



THE REVOLUTIONARY GOVERNMENT OF ZANZIBAR

**MINISTRY OF EDUCATION AND VOCATIONAL
TRAINING**

CONTRACT

FOR

**PROPOSED NEW CONSTRUCTION OF
MWANAKWEREKWE PRIMARY SCHOOL (G+2) IN
UNGUJA**

BETWEEN

**MINISTRY OF EDUCATION AND VOCATIONAL
TRAINING, ZANZIBAR**

AND

M/S. ESTIM CONSTRUCTION COMPANY LTD

CONTRACT NO. SMZ/IME/CW 02/2021-2022

DATE OF SUBMISSION: JANUARY, 2021

CONTRACT AGREEMENT

Contract Agreement

THIS CONTRACT AGREEMENT is made on the ____08____ day of ____01____, ____2022____.

BETWEEN

(1) **Ministry of Education and Vocational Training- Zanzibar** of the Revolutionary Government of Zanzibar having its principal place of business at P.O.Box 394 Mazizini (hereinafter called "the Employer"), and

(2) **M/S ESTI CONSTRUCTION COMPANY LTD**, a corporation incorporated under the laws of Zanzibar and having its principal place of business at P.O. Box 19716 (Hereinafter called "the Contractor").

WHEREAS the Employer invited bids for the Works, described as PROPOSED NEW CONSTRUCTION OF MWANAKWEREKWE PRIMARY SCHOOL (G+2) IN UNGUJA and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein, and the Employer agrees to pay the Contractor the Contract Price of **Tanzania Shillings Three Billion Seven Hundred Ninety Four Million Two Hundred Sixty Six Thousand Fifty One and Seventy Five Cents Only (TZS 3,794,266,051.75) including 15% VAT** or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement.
 - (a) *the Contract Agreement*
 - (b) *the Letter of Acceptance*
 - (c) *the completed Schedules (BOQ)*
 - (d) *the Special Conditions of Contract*
 - (e) *the General Conditions of Contract*
 - (f) *the Specifications*
 - (g) *the Drawings; and*
 - (h) *the Contractor's Bid*
 - (i) *the Notification of Awards*
 - (j) *the Key Personnel*
 - (k) *the Equipment*
 - (l) *the Program of Work*
 - (m) *Minutes of Contract Negotiation*

3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

In witness whereof the parties here to have caused this agreement to be executed in accordance with the laws of Zanzibar on the day, month and year indicated above.

Name: ALI KHAMIS JUMA

Name: PARAG H. RAHANGDALE

Signed: [Signature]
In the Capacity of Principal Secretary

Signed: [Signature]
In the Capacity of PROJECT MANAGER

In the presence of: _____

in the presence of: [Signature]



ESTIM CONSTRUCTION CO. LTD. ZANZIBAR
P.O. Box 1654
ZANZIBAR

at

[Signature]

LETTER OF ACCEPTANCE



THE REVOLUTIONARY GOVERNMENT OF ZANZIBAR
MINISTRY OF EDUCATION AND VOCATIONAL TRAINING

P.O. Box 394
ZANZIBAR-TANZANIA
Website: www.moez.go.tz

Tel: +255-24-2232728
Fax: +255-24-2233306
Email: info@moez.go.tz
pmu@moez.go.tz

Ref: P33/21/9/IMF/VOL.I/231

Date: 28th December, 2021

M/s ESTIM CONSTRUCTION COMPANY LTD
P.O. Box 19716
Dar-Es -Salaam

**NOTIFICATION OF CONTRACT AWARDS FOR PROPOSED NEW CONSTRUCTION
OF MWANAKWEREKWE PRIMARY SCHOOL (G+2) AT URBAN WEST REGION IN
UNGUJA.**

I am pleased to inform you that your tender dated 6th December, 2021 has been evaluated and the Ministry of Education and Vocational Training, Zanzibar is hereby announcing its conditional contract price is **Tanzania Shillings Three Billion Seven Hundred Ninety Four Million Two Hundred Sixty Six Thousand and Fifty One point Seven Five Only (TZS 3,794,266,051.75) including 15% VAT** is here by accepted by our agency.

You are hereby instructed to proceed with the signing of the contract within 7 days after receive of this notification of award.

You are also instructed to submit to us the performance Security before signing of the Contract.

Please contract Secretary, Ministerial of Tender Board to proceed with the signing of the contract and other formalities.

Please confirm your acceptance.

Authorized Signature:

Name and Title of Signature: Ali Khamis Juma
Principal Secretary

Name of Agency: **MINISTRY OF EDUCATION AND VOCATIONAL
TRAINING, ZANZIBAR**

Direct lines to:

Minister 2238205, Principal Secretary 2238210, Deputy Principal Secretary 2234356

Ref. ECCL/21/2356/DP/dn
Date: 30 December 2021

To

The Ministry of Education & Vocational Training
The Revolutionary Government of Zanzibar
P. O. Box: 394
Zanzibar – Tanzania

Dear Sir,

**RE: PROPOSED NEW CONSTRUCTION OF MWANAKWEREKWE PRIMARY SCHOOL
(G+2) AT URBAN WEST REGION IN UNGUJA**

Subj: Acknowledgement & Acceptance of the Notification of Contract Award

We thankfully acknowledge the receipt and accept the Notification of Award for Proposed New Construction of Mwanakwerekwe Primary School (G+2) at Urban West Region in Unguja issued via your letter #P33/21/9/IMFVOL. I/231 dated 28 December 2021.

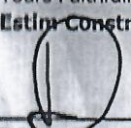
We hereby accept your 'Notification of Contract Award'.

Further, we also confirm to submit in due course of time – the Performance Security in form of a Bank Guarantee with the value equals to ten percent (10%) of the Contract Price.

We once again thank you on behalf of **ESTIM Construction Co. Ltd.** for giving an opportunity for executing the captioned Project. We assure you of our continuing cooperation and best attention at all times, we remain,

Thanking You.

Yours Faithfully,
Estim Construction Co. Ltd.


DARPAN G. PINDOLIA
Director



Estim Construction Company Limited
PO Box 19716,
Dar Es Salaam, Tanzania
Tel: +255 (22) 2774253 / 2775507 / 2771075
Fax: +255 (22) 2709355
estim@estimconstruction.com



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FUA
Ak 31/12*

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05/01/2022*



www.estimconstruction.com

BILL OF QUANTITIES (BOQ)

**REVOLUTIONARY GOVERNMENT OF ZANZIBAR
MINISTRY OF EDUCATION AND VOCATIONAL TRAINING**

PROPOSED CONSTRUCTION OF G+2 PRIMARY SCHOOL

GENERAL SUMMARY

<u>BILLS OF QUANTITIES</u>		TOTAL T.Shs
A	BILL No. 01 - PRELIMINARIES	96,626,000.00
B	BILL No. 02 - TRADE PREAMBLES	N/A
C	BILL No. 03 - MEASURED WORKS	2,454,836,045.00
D	BILL No. 04 - ELECTRICAL INSTALLATION	137,427,000.00
E	BILL No. 05 - EXTERNAL WORKS	92,352,440.00
F	BILL No. 06 - SPECIALIST WORKS	280,823,500.00
G	BILL No. 07 - PC AND PROVISIONAL SUMS	310,775,000.00
SUB TOTAL		T.Shs 3,342,840,045.00
ADD: VAT		15% 501,426,006.75
<u>TOTAL COST FOR THE WORK CARRIED TO FORM OF TENDER</u>		T.Shs 3,844,266,051.75

ESTIM CONSTRUCTION CO. LTD.
P.O. Box 19716
DAR-ES-SALAAM
TANZANIA

[Handwritten signature]

[Handwritten signature]

[Handwritten signature]

SPECIAL CONDITIONS OF CONTRACT

Special Conditions of Contract

SCC Clause	GCC Clause	Description
A: GENERAL		
1.	1.1	<p>The Employer is : Principal Secretary, Ministry of Education and Vocational, Training, Headquarters at Airport Road, Mazizini. P.O. Box 394 City/Town: Mazizini-Zanzibar Country: Tanzania</p> <p>The Project Manager is: Head of Physical Development Division (PDD) Eng Khamis Y. Bakar Ministry of Education and Vocational, Training</p> <p>The name and identification number of the Contract is SMZ/IME/CW 02/2021-2022</p> <p>The Works consist of Classrooms and toilets</p> <p>The Commencement Date shall be Seven (7) days after signing the contract</p> <p>The Completion Date for the whole of the Works shall be Six Month's starting from the date of site position.</p> <p>The Site is located at Urban District Unguja.</p>
2.	3.1	The language of the Contract documents is English . The law that applies to the Contract is the law of Zanzibar .
3.	9.1	Include the Schedule of Other Contractors, if any:.....(give list of other contractors) – N/A
4.	10.1	Include the Schedule of Key Personnel: Project Manager / Contractors Representative, Site Engineer, Mechanical Engineer (Plumbing & Sanitary), Quantity Surveyor, Electrical/ICT Engineer, Environmental, Health and Safety and Social.
7.	14.1	<p>The minimum insurance covers shall be:</p> <ul style="list-style-type: none"> i) loss of or damage to the Works, Plant, and Materials is Tanzania Shillings Five Million (TZS 5,000,000.00) ii) Loss of or damage to Equipment is Tanzania Shilling Three Million (TZS 3,000,000.00). iii) Loss of damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract is Tanzania Shillings Five Million (TZS 5,000,000.00); and iv) personal injury or death for the Contractor's employees is One Hundred Million (TZS 100,000,000.00) and for other people is Ten Million

		(TZS 10,000,000.00)
8.	15.1	Site Investigation Reports available to the Bidder are: None
10.	24.1	The site Possession Date shall be within 28 days after the signing of the Contract.
11.	28.2	Hourly rate of Fees payable to the Arbitrator is None. Types of reimbursable expenses to be paid to the Adjudicator include N/A.
12.	28.3	Arbitration will take place at Zanzibar Commercial Court in accordance with rules and regulations published by Attorney General Chambers.
13.	29.1	Appointing Authority for the Arbitrator is Zanzibar Commercial Court
B. Time Control		
14.	30.1	The Contractor shall Submit a Program for the Works within Seven (7) days of delivery of the Letter of Acceptance.
15.	30.3	The period between Program updates is Three (3) weeks.
16.	30.3	The amount to be withheld for late submission of an updated Program is Tanzania Shillings One Million (TZS 1,000,000.00).
C. QUALITY CONTROL		
17.	38.1	The Defects Liability Period is 365 days.
D: COST CONTROL		
18	46	The interest rate shall be 0% above prevailing interest rate for commercial borrowing from the contractor's bank.
20.	47.1(a) 47.1(m)	The Site Possession Date shall be within 28 days after the signing of the Contract Minimum amount of Interim Payment Certificate will be TZS 200,000,000.00 of contract price.
21.	50	The contract is not subject to price adjustment in accordance with Clause 50 the General Conditions of Contract.
22.	51.1	The amount of retention is Five percent (5%) of value of works of Interim Payment Certificate. Limit of retention will be Ten percent (10%) of contract price
23.	52.1	The amount of liquidated damages is 0.1 percent of contract price per day. The maximum amount of liquidated damages must be equivalent to the amount of the performance security Ten Percent (10%) of the Contract price.
	52.2	If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates

		<i>specified in Sub- Clause 46. Not applicable</i>
24.	53.1	<i>The bonus for early completion is None.</i>
25.	54.1	<p><i>The amount of advance payment shall be Twenty Percent (20%) of the contract sum payable by in the currencies and proportions in which the Accepted Contract Amount is payable and shall be correspond with Advanced Bank Guarantee with same percent and shall be unconditional Bank guarantee from reputable commercial Bank.</i></p> <p><i>Monthly Recovery of Advance Payment: Such percentage of the amount of monthly Interim Payment Certificates, such that when Interim Payment Certificate reaches 80% the Advance recovery shall be 100%.</i></p>
26.	55.1	<i>The Performance Security shall be a minimum amount equivalent to 10% of the contract price and shall be unconditional Bank guarantee from reputable commercial Bank.</i>
E. FINISHING THE CONTRACT		
27.	61.1	<p><i>As built drawings shall be supplied by the contractor by 30 days after the construction completion date.</i></p> <p><i>Operating manual shall be supplied by the contractor by [NIL].</i></p>
28.	61.2	<p><i>The amount to be withheld by the Project Manager in the case the contractor does not submit as built drawings is Tanzania Shillings One Million (TZS 1,000,000.00).</i></p> <p><i>The amount to be withheld by the Project Manager in the case the contractor does not submit operating manual is Tanzania Shillings One Million (TZS 1,000,000.00).</i></p>
29	62.2(g)	<i>Numbers of days for which the maximum amount of liquidated damages can be paid is 28 days</i>
30.	63.1	<i>The percentage to apply to the value of the work not completed, representing the Employer's additional cost for completing the Works, is Twenty percent (20%).</i>

GENERAL CONDITIONS OF CONTRACT

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A. General

*These **General Conditions of Contract (GCC)**, read in conjunction with the **Special Conditions of Contract (SCC)** and other documents listed therein, constitute a complete document expressing the rights and obligations of the parties.*

*These **GCC** can be used for both smaller admeasurement contracts and lump sum contracts.*

1.	Definitions	1.1	<p><i>The Adjudicator is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance.</i></p> <p><i>The Arbitrator is the person appointed to resolve contractual disputes, and as provided for in GCC 27 and 28 hereunder.</i></p> <p><i>Bill of Quantities -means the priced and completed Bill of Quantities forming part of the Bid.</i></p> <p><i>Compensation Events are those defined in Clause 47 hereunder.</i></p> <p><i>The Completion Date is the date of completion of the Works as certified by the Project Manager, in accordance with sub-Clause 58.1.</i></p> <p><i>The Contract is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in Clause 2.3 below.</i></p> <p><i>The Contractor is a person or corporate body who's Bid to carry out the Works has been accepted by the Employer.</i></p> <p><i>The Contractor's Bid is the completed Bid document submitted by the Contractor to the Employer.</i></p> <p><i>The Contract Price is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.</i></p> <p><i>Days are calendar days; months are calendar months.</i></p> <p><i>Day works are varied work inputs subject to payment on a time basis for the Contractor's employees and Equipment, in addition to payments for associated Materials and Plant.</i></p> <p><i>A Defect is any part of the Works not completed in accordance with the Contract.</i></p> <p><i>The Defects Liability Certificate is the certificate issued by Project Manager upon correction of defects by the Contractor.</i></p> <p><i>The Defects Liability Period is the period named in the</i></p>
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			<p>Special Conditions of Contract and calculated from the Completion Date.</p> <p>Drawings means the drawings of the works, as included in the contract and any additional or modified drawings issued by (or on behalf of) the Employer in accordance with the contract.</p> <p>The Employer is the party who employs the Contractor to carry out the Works.</p> <p>Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.</p> <p>The Initial Contract Price is the Contract Price listed in the Employer's Letter of Acceptance.</p> <p>The Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Special Conditions of Contract. Only the Project Manager may revise the Intended Completion Date by issuing an extension of time or an acceleration order.</p> <p>The Intended Commencement Date is the date on which it is intended that the Contractor shall start the Works. The Intended Commencement date is specified in the Special Conditions of Contract. Only the Project Manager may revise the Intended commencement Date by issuing an extension of time.</p> <p>Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.</p> <p>Plant is any integral part of the Works that shall have a mechanical electrical, chemical, or biological function.</p> <p>The Project Manager is the person named in the Special Conditions of Contract (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract.</p> <p>The Site is the area defined as such in the Special Conditions of Contract.</p> <p>Site Investigation Reports are those that were included in the Bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.</p> <p>Specification means the Specification of the Works included in the Contract and any modification or addition made or approved</p>
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			<p>by the Project Manager.</p> <p>The Start Date is given in the Special Conditions of Contract. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.</p> <p>A Subcontractor is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.</p> <p>Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.</p> <p>A Variation is an instruction given by the Project Manager that varies the Works.</p> <p>"Force Majeure" means an event which is beyond the reasonable control of a Party and which makes a Party's performance of its obligations under the Contract impossible or so impractical as to be considered impossible under the circumstances.</p> <p>The Works are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Special Conditions of Contract.</p>
2.	Interpretation	2.1	<p>In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager will provide instructions clarifying queries about these Conditions of Contract.</p>
		2.2	<p>If sectional completion is specified in the Special Conditions of Contract, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).</p>
		2.3	<p>The documents forming the Contract shall be interpreted in the following order of priority:</p> <ol style="list-style-type: none"> (1) Agreement, (2) Letter of Acceptance, (3) Contractor's Bid, (4) Special Conditions of Contract, (5) General Conditions of Contract,

			<p>(6) Specifications,</p> <p>(7) Drawings,</p> <p>(8) Bill of Quantities, and</p> <p>(9) Any other document listed in the Special Conditions of Contract as forming part of the Contract.</p>
3.	Language and Law	3.1	The language of the Contract and the law governing the Contract are stated in the Special Conditions of Contract .
4.	Confidentiality	4.1	The Service Providers, their Subcontractors, and the Personnel of either of them shall not disclose any proprietary or confidential information relating to the Project, the Services, this Contract, or the Employer's business or operations without the prior written consent of the Employer.
5.	Project Manager's Decisions	5.1	Except where otherwise specifically stated, the Project Manager will decide contractual matters between the Employer and the Contractor in the role representing the Employer.
6.	Delegation	6.1	The Project Manager may delegate any of his duties and responsibilities to other people except to the Adjudicator, upon prior written consent of the Employer, and may cancel any delegation after notifying the Contractor.
7.	Communications	7.1	Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered.
8.	Subcontracting	8.1	The Contractor may subcontract with the approval of the Project Manager subject to consultation with the Employer, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations.
9.	Other Contractors	9.1	The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, as referred to in the Special Conditions of Contract . The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.
10.	Personnel	10.1	The Contractor shall employ the key personnel named in the Schedule of Key Personnel, as referred to in the Special Conditions of Contract , to carry out the functions stated in the Schedule or other personnel approved by the Project Manager. The Project Manager will approve any proposed replacement of

			<i>key personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the Schedule.</i>
		10.2	<i>If the Project Manager asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within the period given by Project Manager and has no further connection with the work in the Contract.</i>
11	<i>Employers and Contractor's Risks</i>	11.1	<i>The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks</i>
12.	<i>Contractor's Risks</i>	12.1	<p><i>From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks:</i></p> <p><i>(a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to:</i></p> <p><i>(i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or</i></p> <p><i>(ii) Negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.</i></p> <p><i>(b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war, radioactive contamination or any other disaster that directly affecting the country where the Works are to be executed.</i></p>
		12.2	<p><i>From the Completion Date until the Defects Liability Certificate has been issued, the risk of loss or damage to the Works, Plant, and Materials is an Employer's risk except loss or damage due to:</i></p> <p><i>(a) a defect which existed on the Completion Date,</i></p> <p><i>(b) an event occurring before the Completion Date, which was not itself an Employer's risk, or</i></p> <p><i>(c) the activities of the Contractor on the Site after the Completion Date.</i></p>
13.	<i>Contractor's Risks</i>	13.1	<i>From the Starting Date until the Defects Liability Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment), which are not Employer's</i>

			<i>risks, are Contractor's risks.</i>
14.	Insurance	14.1	<p><i>The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Special Conditions of Contract for the following events which are due to the Contractor's risks:</i></p> <p><i>(a) loss of or damage to the Works, Plant, and Materials;</i></p> <p><i>(b) loss of or damage to Equipment;</i></p> <p><i>(c) loss of or damage to property (except the Works, plant, Materials, and Equipment) in connection with the Contract; and</i></p> <p><i>(d) Personal injury or death.</i></p>
		14.2	<i>The Contractor shall deliver policies and certificates for insurance to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.</i>
		14.3	<i>If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.</i>
		14.4	<i>Alterations to the terms of insurance shall not be made without the approval of the Project Manager.</i>
		14.5	<i>Both parties shall comply with any conditions of the insurance policies.</i>
15.	Site Investigation Reports	15.1	<i>The Contractor, in preparing the Bid, shall rely on any Site Investigation Reports referred to in the Special Conditions of Contract, supplemented by any information available to the Bidder.</i>
16.	Queries about the Special Conditions of Contract	16.1	<i>The Project Manager will clarify queries on the Special Conditions of Contract.</i>
17.	Contractor to Construct the Works	17.1	<i>The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.</i>

18.	<i>Commencement and Completion of Works</i>	18.1	<i>The Contractor is expected to commence execution of the Works by the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.</i>
19.	<i>Approval by the Project Manager</i>	19.1	<i>The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, who is to approve them if they comply with the Specifications and Drawings.</i>
		19.2	<i>The Contractor shall be responsible for design of Temporary Works.</i>
		19.3	<i>The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.</i>
		19.4	<i>The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.</i>
		19.5	<i>All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Project Manager before this use.</i>
20	<i>Protection of the environment</i>	20.1	<i>The Contractor shall take all reasonable steps to protect the environment and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.</i>
		20.2	<i>The Contractor shall ensure that emissions, surface discharges and effluent from his activities shall not exceed values prescribed in relevant environmental laws.</i>
21.	<i>Labour Laws</i>	21.1	<i>The Contractor shall comply with all the relevant labour laws applicable in Zanzibar, including laws relating to workers employment, working hours, health, safety, welfare, immigration and shall allow them all their legal rights.</i>
		21.2	<i>The Contractor shall require his employees to obey all applicable laws, including those concerning safety at work.</i>
22.	<i>Health and Safety</i>	22.1	<i>The Contractor shall at all times take all reasonable precautions to maintain the health and safety of his personnel.</i>
		22.2	<i>The Contractor shall provide the first aid facilities that are available at all times at the site and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics</i>
		22.3	<i>The Contractor shall notify the Employer details of any accident as soon as practicable after its occurrence. The Contractor shall</i>

			<i>maintain records and make reports concerning health, safety, and welfare of persons, and damage to the property, as the Employer may reasonably require.</i>
		22.4	<i>The Contractor shall conduct an HIV-AIDS awareness programme, and shall take other such measures to reduce the risk of transfer of HIV/AIDS or any other STDs between and among Contractor's personnel, the Employers Staff and the surrounding community.</i>
23.	Discoveries	23.1	<i>Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.</i>
24	Possession of the Site	24.1	<i>The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Special Conditions of Contract, the Employer will be deemed to have delayed the start of the relevant activities, and this will be a Compensation Event.</i>
25	Access to the Site	25.1	<i>The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.</i>
26.	Instructions, inspections and audits	26.1	<i>The Contractor shall carry out all instructions of the Project Manager, which comply with the applicable laws where the Site is located.</i>
		26.2	<i>The Contractor shall permit the Government of Zanzibar to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Government of Zanzibar if so required by the Government of Zanzibar.</i>
27.	Disputes	27.1	<i>In the event of any dispute arising out of this contact, either party shall issue a notice of dispute to settle the dispute amicably. The parties hereto shall, within twenty eight (28) days from the notice date, use their best efforts to settle the dispute amicably through mutual consultations and negotiations. Any unsolved dispute may be referred by either party to an arbitrator.</i> <i>Arbitration shall take place at Zanzibar, in accordance with Arbitration Decree, Cap. 25 of the Laws of Zanzibar.</i>
28.	Procedure for Disputes	28.1	<i>The Arbitrator shall give a decision in writing within 28 days of receipt of a notification of a dispute.</i>

		28.2	<i>The Arbitrator shall be paid by the hour at the rate specified in the Bid Data Sheet and Special Conditions of Contract, together with reimbursable expenses of the types specified in the Special Conditions of Contract, and the cost shall be divided equally between the Employer and the Contractor, whatever decision is reached by the Arbitrator. Either party may refer a decision of the Arbitrator within 28 days to the Arbitrator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Arbitrator's decision will be final and binding.</i>
		28.3	<i>The arbitration shall be conducted in accordance with the arbitration procedure published by the institution named and in the place shown in the Special Conditions of Contract.</i>
29	Replacement of Arbitrator	29.1	<i>Should the Arbitrator resign or die, or should the Employer and the Contractor agree that the Arbitrator is not functioning in accordance with the provisions of the Contract, a new Arbitrator will be jointly appointed by the Employer and the Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Arbitrator shall be designated by the Appointing Authority stated in the Special Conditions of Contract at the request of either party, within 14 days of receipt of such request.</i>

B. Time Control

30	Program	30.1	<i>Within the time stated in the Special Conditions of Contract, the Contractor shall submit to the Project Manager for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works.</i>
		30.2	<i>An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.</i>
		30.3	<i>The Contractor shall submit to the Project Manager for approval an updated Program at intervals no longer than the period stated in the Special Conditions of Contract. If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount stated in the Special Conditions of Contract from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.</i>
		30.4	<i>The Project Manager's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Project Manager again at any time. A revised</i>

			<i>Program shall show the effect of Variations and Compensation Events.</i>
31.	<i>Extension of the Intended Completion Date</i>	31.1	<i>The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.</i>
		31.2	<i>The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.</i>
32.	<i>Acceleration</i>	32.1	<i>When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager will obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date will be adjusted accordingly and confirmed by both the Employer and the Contractor.</i>
		32.2	<i>If the Employer accepts the Contractor's priced proposals for acceleration, they shall be incorporated in the Contract Price and treated as a Variation.</i>
33.	<i>Delays Ordered by the Project Manager</i>	33.1	<i>The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.</i>
34.	<i>Management Meetings</i>	34.1	<i>Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.</i>
		34.2	<i>The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.</i>
35.	<i>Early Warning</i>	35.1	<i>The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work increase the Contract</i>

			<i>Price or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall provide by the Contractor as soon as reasonably possible.</i>
		35.2	<i>The Contractor shall cooperate with the Project Manager in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Project Manager.</i>
C. Quality Control			
36.	Identifying Defects	36.1	<i>The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.</i>
37.	Tests	37.1	<i>If the Project Manager instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.</i>
38.	Correction of Defects	38.1	<i>The Project Manager shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the Special Conditions of Contract. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.</i>
		38.2	<i>Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Project Manager's notice.</i>
39.	Uncorrected Defects	39.1	<i>If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager will assess the cost of having the Defect corrected, and the Contractor will pay this amount.</i>

D. Cost Control

40.	Bill of Quantities	40.1	<i>The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.</i>
		40.2	<i>The Bill of Quantities is used to calculate the Contract Price. The Contractor shall be paid for the quantity of the work done at the rate in the Bill of Quantities for each item.</i>
41.	Changes in the Quantities	41.1	<i>If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change not exceeds 1 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change.</i>
		41.2	<i>The Project Manager shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the Employer.</i>
		41.3	<i>If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities.</i>
42.	Variations	42.1	<i>All Variations shall be included in updated Programs produced by the Contractor.</i>
43.	Payments for Variations	43.1	<i>The Contractor shall provide the Project Manager with a quotation for carrying out the Variation when requested to do so by the Project Manager. The Project Manager shall assess the quotation, which shall be given within seven days of the request or within any longer period stated by the Project Manager and before the Variation is ordered.</i>
		43.2	<i>If the work in the Variation corresponds with an item description in the Bill of Quantities and if in the opinion of the Project Manager, the quantity of work above the limit stated in GCC 41 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of Work.</i>
		43.3	<i>If the Contractor's quotation is unreasonable, the Project Manager may order the Variation and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs.</i>

		43.4	<i>If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.</i>
		43.5	<i>The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.</i>
44.	Cash Flow Forecasts	44.1	<i>When the Program is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast.</i>
45.	Payment Certificates	45.1	<i>The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously.</i>
		45.2	<i>The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor within twenty eight (28) days from the receipt of certificate.</i>
		45.3	<i>The Project Manager shall determine the value of work executed.</i>
		45.4	<i>The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.</i>
		45.5	<i>The value of work executed shall include the valuation of Variations, Compensation Events and Variation of Price if applicable.</i>
		45.6	<i>The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.</i>
		45.7	<i>The Project Manager shall not bound to certify any payment, if the net amount, after all retentions and deductions would be less than minimum amount of Interim Payment Certificate stated in the Special Condition of Contract.</i>
46.	Payments	46.1	<i>Payments shall be adjusted for deductions for advance payments and retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 28 days of the date of each certificate. If the Employer makes a late payment the Contractor shall be paid interest on the late payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made at the prevailing rate of interest for commercial borrowing for each of the currencies in which payments are made.</i>
		46.2	<i>If an amount certified is increased in a later certificate or as a result of an award by an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would</i>

			<i>have been certified in the absence of dispute.</i>
		46.3	<i>Unless otherwise stated, all payments and deductions will be paid or charged in the proportions of currencies comprising the Contract Price.</i>
		46.4	<i>Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.</i>
47.	Compensation Events	47.1	<p><i>The following shall be Compensation Events:</i></p> <ul style="list-style-type: none"> <i>(a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Special Conditions of Contract.</i> <i>(b) The Employer modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract.</i> <i>(c) The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time.</i> <i>(d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects.</i> <i>(e) The Project Manager unreasonably does not approve a subcontract to be let.</i> <i>(f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.</i> <i>(g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.</i> <i>(h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.</i> <i>(i) The advance payment is delayed.</i> <i>(j) The effects on the Contractor of any of the Employer's Risks.</i> <i>(k) The Project Manager unreasonably delays issuing a Certificate</i>

			<p><i>of Completion.</i></p> <p><i>(l) Other Compensation Events described in the Contract or determined by the Project Manager shall apply.</i></p> <p><i>(m) after all retentions and deductions would be less than minimum amount of Interim Payment Certificate stated in the SCC. The Project Manager shall not be bound to certify any payment.</i></p>
		47.2	<p><i>If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by, how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.</i></p>
		47.3	<p><i>As soon as the Contractor has provided information demonstrating the effect of each Compensation Event upon the Contractor's forecast cost, the Project Manager shall assess it, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager will assume that the Contractor will react competently and promptly to the event.</i></p>
		47.4	<p><i>The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor's not having given early warning or not having cooperated with the Project Manager.</i></p>
48.	Taxes	48.1	<p><i>The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the date 28 days before the submission of bids for the Contract and the date of the last Completion certificate. The adjustment shall be the change in the amount of tax payable by the Contractor, provided such changes are not already reflected in the Contract Price. Not applicable</i></p>
50.	Price Adjustment	50.1	<p><i>If applicable, the amounts payable to the Contractor, in various currencies pursuant to sub-Clause 45, shall be adjusted in respect of the rise or fall in the cost of labor, Contractor's Equipment, Plant, materials, and other inputs to the Works, by applying to such amounts the formulae prescribed in this clause.</i></p>
		50.2	<p><i>To the extent that full compensation for any rise or fall in costs to the Contractor is not covered by the provisions of this or other clauses in the Contract, the unit rates and prices included in the Contract shall be deemed to include amounts to cover the contingency of such other rise or fall of costs.</i></p>

		50.3	<p>The adjustment to be applied to amount payable to the Contractor as certified in Payment Certificates shall be determined formulae for each of the currencies in which the Contract Price is payable. No adjustment is to be applied to work valued on the basis of Cost or current prices. The formulae shall be as follows;</p> $P_n = a + b \frac{L_n - L_o}{L_o} + c \frac{M_n - M_o}{M_o} + d \frac{E_n - E_o}{E_o} + \text{etc.}$
			<p>where;</p> <p>P_n is a price adjustment factor to be applied to the amount in each specific currency for the payment of the work carried out in the subject month, where such variations and daywork are not otherwise subject to adjustment;</p>
			<p>a is a constant, specified in the Appendix to Bid, representing the nonadjustable portion in contractual payments;</p> <p>b, c, d, etc., are weightings or coefficients representing the estimated proportion of each cost element (labor, materials, equipment usage, etc.) in the Works or sections thereof, net of Provisional Sums, as specified in the Appendix to Bid; the sum of a, b, c, d, etc., shall be one;</p> <p>L_n, M_n, E_n, etc., are the current cost indices or reference prices of the cost elements in the specific currency of origin for month "n," determined pursuant to Sub-Clause 49.5, applicable to each cost element; and</p> <p>L_o, M_o, E_o, etc., are the base cost indices or reference prices corresponding to the above cost elements at the date specified in Sub-Clause 49.5</p>
			<p>The value of net work done, certified by the Project Manager, in any monthly Interim or Final Certificate as payable by the Employer to the Contractor before deduction of any retention money shall be increased or decreased by an amount of 'F'.</p> $F = P_n \times P_c$
			<p>where;</p> <p>The effective value P_c of work done which is to be subjected to increase or decrease shall be the difference between:</p> <p>(i) the amount which, in the opinion of the Project</p>

			<p>Manager, is due to the Contractor under Clause 45 (before deduction of retention money and before deducting sums previously paid on account) less:</p> <ul style="list-style-type: none"> • any amount for payment or repayment of any advance payment; • any amount for materials on site (if any); • any amounts for nominated sub-contractors (if any) • any amounts for any other items based on actual cost or current prices; or • any sums for increase or decreases in the Contract Price paid under this Sub-Clause <p style="text-align: center;">and</p> <p>(ii) the amount calculated in accordance with (i) above of this Sub-clause and included in the last preceding statement.</p>
		50.4	<p>The sources of indices shall be those listed in the Appendix to Bid, as approved by the Engineer. Indices shall be appropriate for their purpose and shall relate to the Contractor's proposed source of supply of inputs on the basis of which his Contract Price and expected foreign currency requirements shall have been computed. As the proposed basis for price adjustment, the Contractor shall have submitted with his bid the tabulation of Weightings and Source of Indices in the Appendix to Bid, which shall be subject to approval by the Engineer.</p>
		50.5	<p>The base cost indices or prices shall be those prevailing on the day 28 days prior to the latest date for submission of bids. Current indices or prices shall be those prevailing on the day 28 days prior to the last day of the period to which a particular Interim Payment Certificate is related. If at any time the current indices are not available, provisional indices as determined by the Engineer will be used, subject to subsequent correction of the amounts paid to the Contractor when the current indices become available</p>
		50.6	<p>If the Contractor fails to complete the Works within the time for completion prescribed under Clause 57 adjustment of prices thereafter until the date of completion of the Works shall be made using either the indices or prices relating to the prescribed time for completion, or the current indices or prices, whichever is more favorable to the Employer, provided that if an extension of time is granted pursuant to Clause 28, the above provision shall apply only to adjustments made after the expiry of such extension of time.</p>
		50.7	<p>The weightings for each of the factors of cost given in the Appendix to Bid shall be adjusted if, in the opinion of the Engineer, they have been rendered unreasonable, unbalanced, or inapplicable as a result of varied or additional work already executed or instructed under Clause 42 or for any other reason.</p>
51.	Retention	51.1	<p>The Employer shall retain from each payment due to the Contractor the proportion stated in the Special Conditions of Contract until</p>

			<i>Completion of the whole of the Works.</i>
		51.2	<i>On completion of the whole of the Works, half the total amount retained shall be repaid to the Contractor and the other half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor before the end of this period have been corrected.</i>
		51.3	<i>On completion of the whole Works, the Contractor may substitute retention money with an 'on demand' Bank guarantee.</i>
52.	Liquidated Damages	52.1	<i>The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Special Conditions of Contract for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount defined in the Special Conditions of Contract. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.</i>
		52.2	<i>If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in Sub- Clause 46.</i>
53.	Bonus	53.1	<i>The Contractor shall be paid a Bonus calculated at the rate per calendar day stated in the Special Conditions of Contract for each day (less any days for which the Contractor is paid for acceleration) that the Completion is earlier than the Intended Completion Date. The Project Manager shall certify that the Works are complete, although they may not be due to be complete.</i>
54.	Advance Payment	54.1	<i>The Employer shall make advance payment to the Contractor of the amounts stated in the Special Conditions of Contract by the date stated in the Special Conditions of Contract, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will not be charged on the advance payment.</i>
		54.2	<i>The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, mobilization and other expenses required specifically for execution of the Contract. If required by the Employer, the Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.</i>

		54.3	<i>The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Bonuses, or Liquidated Damages.</i>
55.	Performance Securities	55.1	<i>The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the Employer. The Performance Security shall be valid until a date 28 days from the date of issue of the Certificate of Completion in the case of a Bank Guarantee, and until one year from the date of issue of the Completion Certificate in the case of a Performance Bond</i>
56.	Day works	56.1	<i>If applicable, the Day works rates in the Contractor's Bid shall be used for small additional amounts of work only when the Project Manager has given written instructions in advance for additional work to be paid for in that way.</i>
		56.2	<i>All work to be paid for, as the Contractor on forms approved by the Project Manager shall record Day works. Each completed form shall be verified and signed by the Project Manager within two days of the work being done.</i>
		56.3	<i>The Contractor shall be paid for Day works subject to obtaining signed Day works forms.</i>
57.	Cost of Repairs	57.1	<i>Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Liability Periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.</i>

E. Finishing the Contract

58.	Completion Certificate	58.1	<i>The Contractor shall request the Project Manager to issue a certificate of Completion of the Works, and the Project Manager will do so upon deciding that the work is completed.</i>
59.	Taking Over	59.1	<i>The Employer shall take over the Site and the Works within seven days of the Project Manager's issuing a certificate of Completion.</i>
60.	Final Account	60.1	<i>The Contractor shall supply the Project Manager with a detailed</i>

			<p>account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate.</p>
61.	Operating and Maintenance Manuals	61.1	<p>If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Special Conditions of Contract.</p>
		61.2	<p>If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Special Conditions of Contract, or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount stated in the Special Conditions of Contract from payments due to the Contractor.</p>
62.	Termination	62.1	<p>The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.</p>
		62.2	<p>Fundamental breaches of Contract shall include, but not be limited to, the following:</p> <ul style="list-style-type: none"> a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager; b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 28 days; c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or incorporation; d) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 84 days of the date of the Project Manager's certificate; e) the Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager; f) the Contractor does not maintain a Security, which is

			<p><i>required; and</i></p> <p>g) <i>the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in the Special Conditions of Contract.</i></p> <p>h) <i>If the Contractor, in the judgment of the Employer, has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.</i></p>
		62.3	<i>When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under sub-Clause 61.2 above, the Project Manager shall decide whether the breach is fundamental or not.</i>
		62.4	<i>Notwithstanding the above, the Employer may terminate the Contract for convenience.</i>
		62.5	<i>If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.</i>
63.	Payment upon Termination of Contract	63.1	<i>If the Contract is terminated because of a fundamental breach by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as indicated in the Special Conditions of Contract. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.</i>
		63.2	<i>If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.</i>
64.	Property	64.1	<i>All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if the Contract is terminated because of the Contractor's defaulted.</i>
65.	Release from Performance	65.1	<i>If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as</i>

			<i>quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.</i>
66,	<i>Suspension of Financing</i>	66.1	<p><i>In the event that the source of financing is suspended to the Employer, from which part of the payments to the Contractor are being made:</i></p> <p><i>(a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the financing agency's suspension notice.</i></p> <p><i>(b) If the Contractor has not received sums due it within the 28 days for payment provided for in Sub-Clause 45.1, the Contractor may immediately issue a 14-days termination notice.</i></p>
67,	<i>Force Majeure</i>	67.1	<p><i>Force Majeure; means an unforeseeable event is beyond reasonable control of either party and make a party's performance of its obligations under the contract impossible or so impractical as to be considered impossible under the circumstance for the purposes of this contract "Force Majeure" means an event which is beyond the reasonable control of a Party, is not foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of a Party, and which makes a Party's performance of its obligation hereunder impossible or so impractical as reasonable to be considered impossible in the circumstances and includes, but is not limited to, war, riots, civil disorder, earthquake, fire, explosion, storm, flood, epidemics, or other adverse weather conditions, strikes, lockouts or other industrial action (except where such strikes, lockouts or other industrial action are within the power of the Party invoking Force Majeure to prevent), confiscation.</i></p> <p><i>(a) Neither Party shall have any liability or be deemed to be in breach of the Contract for any delay or other failure in performance of its obligations under the Contract, if such delay or failure is a result of an event of Force Majeure.</i></p> <p><i>(b) If a Party (hereinafter referred to as " the Affected Party" is or will be prevented from performing its substantial obligation under the contract by Force Majeure, it shall give a Notice to the other Party giving full particulars of the event and circumstance of Force Majeure and the reasons for the event of Force Majeure preventing the Affected Party from, or delay the Affected Party from performing its obligations under the Contract. The Notice shall be given within fourteen days after the Affected Party becomes aware, or should have become aware, of the relevant event or circumstances constituting Force Majeure.</i></p> <p><i>(c) The Affected Party shall use reasonable effort to</i></p>

			<p><i>mitigate the effects of the event of Force Majeure and shall endeavour to minimise any delay in the performance of the contract as a result of Force Majeure.</i></p> <p><i>(d) The Affected Party shall give Notice to the other Party when it ceases to be affected by the Force Majeure.</i></p> <p><i>(e) Upon completion of the event of Force Majeure and issuance Notice pursuant to GCC. 67.1 the Affected Party must, as soon as reasonably practicable recommends the performance of its obligation under the contract. Where the Affected Party is the Contractor, the Contractor must provide a revised Work Program rescheduling the Works to minimise the effect of the prevention or delay caused by the event of Force Majeure.</i></p> <p><i>(f) Release from Performance: in the event the Affected Party have used all reasonable efforts to mitigate the effects of events of Force Majeure and minimise any delay in the performing of the contract as result of Force Majeure, but the effect of the Force Majeure still subsist, the Project Manager shall certify that the Contract has been frustrated.</i></p> <p><i>(g) Release from Performance: upon certification by the Project Manager pursuant to GCC. 67.1 the Contractor shall make the site safe and stop work as quickly as possible after receiving the certificate and shall be paid for all Works carried out.</i></p>
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SPECIFICATIONS

SPECIFICATIONS

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Specification
Generally

(2/1)
GENERALLY
LIST OF CLAUSES

- A.1 Standard of materials
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- A.17 List of Drawings – see page (vii)

A.1 Standard of materials

Throughout this document, products, materials and workmanship have been specified to be in accordance with relative British Standard Specifications or British Codes or Practice.

If products or materials which comply with these standards are no longer locally available or not imported and the tenderer, if awarded this contract, intends to use other materials which do not comply with these standards, then tenderers must allow in their prices for the best quality of such materials s in locally available.

In the event of the tenderer allowing in his prices for using alterative standards of materials to those specified, his tender must be qualified by listing the various alternatives to be used. The successful tenderer must then subsequently submit samples of the alternative materials to the Architect as soon as practicable after the award of the contract, and must obtain his written approval before purchasing the particular materials.

Where alternative materials are not listed with the tender, the tenderer will be deemed to have allowed in his prices for the standard of materials specified.

A.2 Alterations or qualifications

No alteration addition or qualification of any kind whatsoever may be made by the Tenderer to the text of the Bills of Quantities.

If any alteration addition or qualification is made by him it will be ignored and the text as prepared by the Quantity Surveyor will be rigidly adhered to.

Tenderers must tender strictly on the basis of the terms and conditions of contract specified in this document. Tenderers wishing to put forward alternative conditions may only do so by submitting an alternative tender under the terms and conditions which they wish to substitute for the conditions given in this document. Tenderer submitting an alternative tender must however also tender on the conditions given in this document, otherwise their tender will be automatically disqualified.

A.3 Contractor to Check

The Contractor is required to check the page numbers of the Bills of Quantities and should any be found missing or in duplicate or other figures or writing indistinct, the Contractor must notify the Quantity Surveyors at once and have the matter rectified before the Tender is submitted. No liability whatsoever will be entertained in respect of any claim for errors in the Contractor's Tender resulting from failure to comply with the foregoing.

A.4 Details to be Private and Confidential

The Drawings, Bill of Quantities and Contract Documents applicable to this Contract are restricted by copyright.

The Contractor shall treat the details of this Contract as Private and Confidential for his own information only and shall not publish or disclose the details of the Contract in any trade or technical paper or disclose the details of the Contract in any trade or technical paper or elsewhere (except as necessary for the purpose hereof) without the previous consent in writing of the Employer.

A.5 Method of Measurement and Notes

The whole of the work contained in these Bills of Quantities is measured in accordance with the Standard Method of Measurement of Building Works for East Africa – metric edition October 1970 published by the Architectural Association of Kenya, Chapter of Quantity Surveyors, and such measurements and descriptions contained in these Bills shall be deemed to be full and sufficient for the purpose of this Contract, subject to the correction of omissions and errors in accordance with Clause 12(2) of the Conditions.

Specification

Generally (2/ A/2)

A.5 Method of Measurement and Notes (Contd)

Notwithstanding the provision of SMM Clause A.6 (a),(b) and (c), fractions of a unit or of a kilogramme less than half which would cause an entire item to be eliminated have been regarded as whole indicating a reference e.g. BS, type, grade.

The following abbreviations have been used:-

Number	No
Metre	M
Lineal metres	LM
Square metres	SM
Cubic metres	CM
Kilogrammes	KG
Millimetre	mm
Centimetre	cm

A.6 Standard Measurements

All units of weights and measurements shall have the meaning ascribed to them by the Weights and Measures Ordinance, CP. 426.

A.7 Dimensions and Details

Figured dimensions on the drawings shall be followed in preference to scaled dimensions and drawings to a large scale shall be followed in preference to those of a smaller scale

except for reinforced concrete drawings and details in which case only figured dimensions shall be followed.

A.8 Drawings

Before tendering the Contractor should examine the drawings which may be seen at the offices of the Architect during normal office hours, and shall satisfy himself regarding their detail as no claim by reason of ignorance in this connection will be entertained.

A.9 Shop Drawings

Shop Drawings of all fabricated work to be done by the Contractor shall be submitted to the Architect for approval, and no work shall be fabricated by the Contractor, save at his own risk, until approval has been given.

These shop drawings shall be submitted in quadruple.

The Contractor shall submit 4 copies of shop drawings sufficiently in advance of requirements to afford the Architect ample time for checking them; including time for correcting, resubmission and rechecking if necessary, and no claim for extension of the Contract period will be granted to the Contractor by reason of his failure in this respect. Two final corrected, certified copies shall be filed with the Architect.

All shop drawings submitted must bear the stamp of approval of the Contractor as evidence that the drawings have been checked by the Contractor. Any drawings submitted without this stamp of approval will not be considered and will be returned to the Contractors for proper resubmission.

If the shop drawings show variations from the requirements of the Contract because of standard shop practice or other reason, the Contractor shall make specific mention of such variation in his letter of transmittal in order that, if accepted, suitable action may be taken for proper adjustment, otherwise the Contractor will not be relieve of the responsibility for executing the work in accordance with the Contract even though such shop drawings have approved.

Where a shop drawing as submitted by the Contractor indicates a departure from the Contract which the Architect deems to be a minor adjustment in the interest of the Employer not involving a change in the Contract Sum or extension of time, the Architect may approval the drawing.

Specification

Generally

(2/A/3)

A.9 Shop Drawings (Cont'd)

The approval of shop drawings will be general and shall not relieve the Contractor from the responsibility for adhesive to the Contract, nor shall it relieve him of the responsibility for any error which may exist.

A.10 Preambles to Sections

To avoid long description and repetition, certain descriptions of measured items refer to the preambles by quoting the clause prefix or by using the words “as described”. Whether so referred to or not all instructions and information contained in the preambles clauses shall be deemed to have been taken into consideration in pricing the whole of these bills.

A.11 Pricing

A pricing or rate is to be entered against each item where provision is made in the Bills of Quantities whether quantities are stated or not. Items against which no rate or price is entered shall be deemed to be covered by other prices or rates in the Bills and no other adjustment will be made in respect of such omission

A.12 Examination of rates and Prices

The priced Bills of Quantities will be examined prior to the appointment of the Contractor and the signing of the Contract in order to ascertain that the quantities are correctly extended and that the summations are in order.

In the event of any error being found in the computation of the tender Sum, such error will be notified to the tenderer, who will then have the opportunity of confirming or withdrawing his tender. If the tender as submitted is confirmed, all rates and prices (excluding preliminary items, contingencies, prime cost sums and any profit and attendance added thereto by the tenderer and Insurance and Surety costs) inserted therein are to be considered reduced or increased or increased in the same proportion as the corrected total of priced items exceeds or falls short of the original total of such items.

A.13 Abbreviations etc.

Words importing the singular only also include the plural and vice versa where the context requires.

The term “and the like” used in these bills shall mean analogous work to that described in accordance with the groupings indicated in the Standard Method of Measurement.

The term “the works” shall mean the whole of the works envisaged by this Contract, including, unless expressly stated otherwise, the works of Nominated Sub-Contractors, Nominated Suppliers, Local Authorities and Public Undertakings.

The followings have been used in the description of items in these bills:-

B.S.	British Standard Specification
B.S.C.P.	British Standard Code of Practice
SMM	Standard Method of Measurement of Building Works for East Africa (First Edition) Metric October 1970
CI	Preamble clause number
P.C.	Prime Cost

(m.s.) (measured separately)

A.14 Queries during tendering

Any doubt or obscurity as to the meaning or intention of the Contract Documents, or any question arising, shall be taken up in writing, before the Tender is submitted, with the Architect who will upon request, set out the intent and meaning of any Part.

Specification
Generally

(2/A/4)

A.15 Preparation of Tender

No claim will be allowed for traveling or other expenses which may be incurred by the Contractor in visiting the site or preparing the Tender for Works.

A.16 Bills of Quantities not to be used for ordering

The Quantities stated in these Bills of Quantities shall not be used for the ordering of materials.

Generally Specification

(2/A/7)

DEMOLITION AND ALTERATIONS

(a) LIST OF CLAUSES

QUALIFICATIONS OF THE RULES OF THE SMM

C.1 Shoring and scaffolding

DEMOLITIONS

C.2 Generally

C.3 Credit for materials

C.4 Old materials to be re-used

C.5 Temporary screens

C.6 Making good

C.7 Existing services

C.8 Adjoining property

Specification

Demolitions and Alterations

(2/C/1)

DEMOLITIONS AND ALTERATIONS

QUALIFICATION OF THE RULES OF THE SMM

C.1 Shoring and scaffolding

Notwithstanding the provisions of SMM Clause C.1 (b), the descriptions of all items of demolitions and alterations shall be deemed to include all incidental shoring and scaffolding.

DEMOLITIONS

C.2 Generally

Whenever materials are stated to be taken down, demolished or removed, prices shall, unless otherwise stated, include for carting away the said items along with all other debris arising to a tip to be provided by the Contractor. Debris is to be carted away daily as it accumulates so as not to clutter up the site. The location of the tip shall be to the approval of the Architect.

Masonry and concrete structure shall be sprayed with water before demolition to reduce the resultant nuisance from dust to a minimum.

C.3 Credit for materials

All materials arising from the demolitions shall become the property of the Contractor unless described as set aside for re-use or as to become the property of the Employer or such similar expression.

C.4 Old materials to be re-used

Where described as to be set aside or stored for re-use, old materials shall be cleaned, repaired and serviced as necessary, to render them, in the opinion of the Architect, perfectly suitable for re-use, and shall be properly stored until required for such re-use.

C.5 Temporary screens

If required by the Architect moveable screens shall be placed in the positions instructed by him and shall be repositioned throughout the Contract as directed by him.

The prices entered against items of demolitions and alterations shall be deemed to include any temporary screens required by the Architect other than those for which measured items have been included hereinafter.

C.6 Making good

Where described as making good, this shall include making good finishings up to, and to match exactly, old finishings. Decoration shall be deemed to be included when specifically mentioned.

C.7 Existing services

In the disconnection and sealing of services the Contractor is to comply with the requirements of the Authorities concerned and is to allow in his prices for serving all notices and paying all fees as necessary. The Contractor must take all necessary precautions and will be responsible for damage caused to any underground cables or services which exist on site.

C.8 Adjoining property

In the Execution of the demolition work the Contractor is to ensure that adjoining public and private properties, roads, pavements, drains etc., are not damaged and the Contractor will be entirely responsible for any injury or damage to persons or property resulting from the works in his contract.

Specification

Demolitions and Alterations

(2/C/2)

EXCAVATION AND EARTHWORK

(b) LIST OF CLAUSES

DEFINITIONS

D.1 Removing trees, hedges or the like

D.2 Surface level

D.3 Clearing site

D.4 Rock

GENERALLY

D.5 Levels

D.6 Bore holes and nature of the soil

D.7 Unauthorized excavations

D.8 Borrow pits

MATERIALS

D.9 Blinding

D.10 Hardcore

D.11 Approved filling for filling under floors

D.12 Soil for backfilling around foundation

WORKMANSHIP

D.13 Generally

D.14 Removal of obstructions

D.15 Bottoms of excavations to be approved

D.16 Disposal of excavated material

D.17 Excavation below required levels

D.18 Timbering, planking and strutting, etc.

D.19 Timbering, planking and strutting etc, left in

D.20 Filling

D.21 Consolidation of hardcore

D.22 Existing services

D.23 Protection

Specification

Excavation and Earthwork

(2/D/1)

D.24 Anti termite treatment

D.25 Method of measurement

Specification

Excavation and Earthwork

(2/D/2)

EXCAVATION AND EARTHWORKS

DEFINITIONS

D.1 Removing trees, hedges and the like

The removal from site of trees, stumps and roots, hedges, bushes, scrub, undergrowth and the like shall be deemed to be included with the items for cutting down and grubbing up roots.

D.2 Surface level

The term "Surface level" shall mean the ground level after clearing site.

D.3 Clearing site

The description of clearing site shall be deemed to include clearing and removing from the site of all loose debris and rubbish, bushes, scrub, undergrowth, vegetation and small trees (i.e. not exceeding 600 mm girth), and grubbing up their roots.

D.4 Rock

The term 'rock' shall mean any natural material which cannot be dislodged by a pick and which can only be removed by the use of compressors or by blasting or wedging.

This classification does not include materials such as loose rock, concrete or other materials that can be removed by means other than drilling and blasting or drilling and wedging, but which for reasons of economy in excavating; the Contractor prefers to remove by drilling and wedging.

Unless specifically stated hereafter, the Contractor must assume that permission to use explosive to remove rock will be refused and he must therefore price for removing rock by compressors etc. only.

GENERALLY

D.5 Level

The levels shown on the various drawings relate to the ground floor finished floor levels.

The Contractor shall be responsible for setting up and maintaining a site datum level accurately ascertained from this work. Immediately following the issue of the Order to Commence, the Contractor shall carry out and record a check level grid of the site which shall be agreed between the Architect and the Contractor within one week of the above Order being given, no alteration of levels shall be undertaken until agreement has been reached and the Architect's instructions has been received.

D.6 Bore holes and nature of the soil

It will be deemed that the Contractor has inspected the drawings and site and has consulted all available information concerning subsoil conditions before submitting the Tender. In making information available on subsoil conditions, the Employer does not in any way absolve the Contractor from his responsibilities, nor is it guaranteed that similar conditions apply to any specific part of the site.

Specification
Excavation and Earthwork

(2/D/3)

D.7 Unauthorized excavation

The Contractor is prohibited from making excavations other than those approved by the Architect as necessary for the works.

D.8 Borrow pits

No borrow pits will be allowed to be opened on the site.

MATERIALS

D.9 Blinding

Blinding shall be of the same materials as the hardcore be, crushed and graded from 4 mm upwards, free from clay, chemical or other pollution, pests, weed roots and rubbish.

D.10 Hardcore

Hardcore shall be good, clean, hard, broken stone broken placing to pass a 100 mm ring and free from all rubbish.

D.11 Approved filling for filling under floors

Approved filling for filling under floors shall be clean, dry pit or river sand excavated material or subsoil free from clay, roots and any impurities.

D.12 Soil for backfilling around foundations

Soil for backfilling around foundations shall be dry, clean subsoil free from clay, vegetable soil, roots and rubbish.

WORKMANSHIP

D.13 Generally

The Contractor shall control the grading around the building so as to prevent water running into excavated areas and into completed sections of the works.

D.14 Removal of obstructions

In the event of any derelict foundations, walls, slabs, kerbs, etc., being discovered upon the site of the works, they shall, if below new foundations are completely removed to a level of 150 mm below the level of the excavation indicated on the drawings. For graded or planted areas any such obstruction shall be removed to a depth of 600 mm below the finished grade.

Filling voids caused by removal of such obstructions shall be executed in accordance with Clause D.20 herein

D.15 Bottoms of excavations to be approved

The Contractor shall give the Architect at least 48 hours' notice (this time shall be doubled if the site of the works is more than 100 kilometers from the nearest permanent office of the Architect or Engineer) when the excavations will be ready for inspection. The bottom of every excavation will be inspected by the Architect and the level thereof agreed between the Architect and the Contractor. If a good bearing bottom is not obtained at the level shown the Architect is to be informed. No concrete is to be laid until the bottom has been approved and the level thereof taken. Any concrete work or other work done before such approval, shall, if so directed be removed and new work substituted after excavations have been approved, all at the Contractors expense.

Specification

Excavation and Earthwork

(2/D/4)

D.15 Bottoms of excavations to be approved (Cont'd.)

Notwithstanding such approval, any bottom which becomes waterlogged or otherwise spoilt after approval, shall be cleaned out and reformed to the Architect's approval before any concrete is placed.

D.16 Disposal of excavated material

Vegetable soil shall be spread and leveled where directed by the Architect on site. Surplus excavated material where directed or required shall be removed from the site to a tip, the location of which shall first be approved by the Architect in writing.

All fees and charges in connection there with shall be deemed to be included in the Contract Sum.

D.17 Excavation below required levels

Should any excavation be taken below the required levels or the depths necessary to obtain a suitable bottom, the Contractor will be required to fill in the excavation to the proper level with concrete of the same specification for the foundations at his own expense.

D.18 Timbering, planking and strutting, etc

The Contractor shall provide all necessary timbering, planking and strutting, etc., to uphold the faces of excavations, which shall only be removed when it is safe to do so.

D.19 Timbering, planking, strutting, etc., left in

Where the Architect instruct or agrees that it is necessary for the safety of the works to leave in certain timbering, planking and strutting, etc., such timber shall be measured and agreed before covering up.

D.20 Filling

Return filling around foundations and filling to make up levels under floors and pavings shall not be deposited until the formation level has been approved by the Architect. In no case shall fill be deposited on a muddy formation. Filling shall be deposited in layers not exceeding 250 mm in depth before compaction and shall be compacted by rolling, pneumatic tamping or other approved means over the whole of the area. If necessary the filling shall be allowed to dry or be moistened to the correct moisture content before compaction. The finished surface shall be approved by the Architect prior to further Construction work thereon.

The Contractor shall afford every assistance to the specialist executing site sterilization to enable each layer to be treated separately.

Filling around foundations in layers shall not proceed without each layer being so treated.

No excavation or foundation work shall be filled in or covered up until all measurements necessary for the adjustment of variations have been made. Walling shall not be built upon the foundations until four days after depositing of concrete.

D.21 Consolidation of hardcore

Hardcore shall be consolidated with a roller, vibrating roller, or mechanical punner to a compaction equivalent to that obtained with a 2.5 to 3 tone roller, care being taken that no damage is done to the foundation walls.

Hardcore shall be blinded and have the interstices filled to receive concrete beds and the like with blinding as described herein. Before placing concrete hardcore beds shall be well watered through a sprinkler rose, and rolled, to prevent water absorption from the concrete. (Cont'd.)

Specification

Excavation and Earthwork

(2/D/5)

D.21 Consolidation of hardcore (Cont'd.)

Where described as blinded to receive building paper or polythene or any other membrane the blinding shall be finished and compacted with fine material which will not cause the membrane to puncture under wheel or foot traffic or by the placing of concrete thereon.

D.22 Existing services

Active existing services shall be adequately protected from damage. Where active services are encountered but not shown on the drawings, the Architect shall be notified by the contractor.

Where inactive services are encountered upon the site of the works, they shall be removed or sealed off in accordance with the direction of the Architect.

D.23 Protection

The Contractor shall protect all graded and filled areas from the actions of the elements. Any settlement or washing that occurs prior to acceptance of the works shall be repaired and grades re-established to the required elevations and slopes.

D.24 Anti termite treatment

Anti termite treatment shall be carried out using 'Gladiator 1.0%' solution or other chemical approved by the Architect in writing, diluted to a water emulsion containing a minimum of 1.0% of the chemical.

The treatment shall be applied to the whole area of the hardcore bed immediately prior to the placing of the concrete floor slab at the rate of 7 litres per square meter, and to the backfilling on both sides of all perimeter walls at the rate of 80 litres per cubic meter of backfilling on both sides of all perimeter walls at the rate of 80 litres per cubic meter of backfilling. Each compacted layer of backfilling shall be separately treated.

Treatment shall not be applied whilst it is raining or to surfaces of backfilling which are wet.

The Contractor's attention is drawn to the fact that 'Gladiator' is toxic to animal and human life, and he shall prevent contamination of water supply systems, shall cover

up and protect treated areas immediately after treatment and post written notices informing of the treatment at prominent points on the site of the building.

Immediately following treatment, the Contractor shall provide to the Architect for onward transmission to the Employer, a written five year guarantee which guarantees

- (a) that the chemical used complies with this specification and has been used in the concentrations stated herein,
- (b) the guarantee shall be continuous for a period of five years from the date of treatment,
- (c) that should infestation by any termites appear before the end of the five year period, the Contractor will return and retreat as necessary to eliminate the infestation entirely and at his own cost on each occasion that infestation appears within the five year period,

The Contractor shall carry out annual inspections commencing three months after treatment and continuing to the end of the guarantee period to ascertain the presence of termites, and should any presence be found, the Contractor shall retreat as necessary to eliminate any infestation entirely and at his own cost on each occasion that infestation is found.

Specifications

Excavation and Earthwork

(2/D/6)

D.25 Method of measurement

The prices throughout this Document are to include for digging in any type of ground including loose or compacted hardcore, rubble debris and the like, roots, or normal obstructions, with the exception of rock as defined herein and excluding any existing foundations, walls and similar hard substances. The Contractor must give notification to the Architect or his representatives as soon as he considers rock as defined herein or existing foundations are encountered so that its extent can be agreed with the Architect, Clerk of Works, or Quality Surveyor before the work is carried out or covered up. Payment for such excavation will not be allowed unless this procedure is followed.

The formation and removal of temporary spoil heaps and multiple handling or excavated material shall be deemed to be included in the prices for returning excavated material around foundations, earth filling and removing surplus excavated material from site.

Excavation for plain concrete foundation has been measured to the net sizes required by concrete dimensions. Formwork has been measured to the sides of all reinforced concrete foundations or bases, together with the necessary working space allowance required under the provisions of SMM Clause D5(f). should the Architect direct or

approve the pouring of concrete to reinforced foundations or bases against the face of excavations, such adjustment will be measured and valued in accordance with the Conditions of Contract.

Rates for excavation shall be deemed to include for leveling, trimming and compacting bottoms and any additional excavation required for planking and strutting.

Specification

Excavation and Earthwork

(2/D/7)

CONCRETE WORK

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Concrete work

(2/F/2)

CONCRETE WORK

QUALIFICATIONS OF THE RULES OF THE SMM

F.1 Beds or the like laid in bays

Notwithstanding the provisions of SMM Clause F.5 (c) the descriptions of work laid in bays shall be deemed to include formwork between the bays.

F.2 Steel bar reinforcement

Notwithstanding the nomenclature of SMM Clauses F.16 (b) and F.17 (a), the description of steel bar and fabric reinforcement shall be deemed to include bends, hooks, tying wire, distance blocks and ordinary spacers, unless otherwise described.

F.3 Wrought formwork

Notwithstanding the nomenclatures of SMM Clause F.19 (f), formwork required to produce fair concrete surface is herein qualified by a description of the finish required.

F.4 Formwork to grooves chases, chamfers and moldings

Notwithstanding the provisions of SMM Clause F.23 (b), the descriptions of formwork shall be deemed to include forming chamfers not exceeding 50 mm wide and forming splayed internal angle not exceeding 25 mm wide.

F.5 Making good

Withstanding the provisions of SMM Clause F.50 the descriptions of holes and mortises shall be deemed to include making good concrete.

DEFINITIONS

F.6 Designations of concrete mixes

The various mixes of concrete are designated in the subsequent measured items by the following criteria:-

Nominal mixes: By the weight proportions of whole bags of ordinary Portland cement to fine and coarse aggregates and by the maximum size of coarse aggregate. The Contractor shall regularly submit details giving specific gravities and moisture content of aggregate.

F.7 Tamping

The term “tamping” as used herein in conjunction with the phrase “treating surfaces of unset concrete” shall mean the final compaction and surface finish to be applied to unset concrete beds, or the like, with a steel shod beam tamper, either manually or mechanically operated unless otherwise stated. The resulting surface finish shall have a slightly ribbed appearance.

F.8 Keying

The term “keying” as used herein in conjunction with the phrase “treating surfaces of unset concrete” shall mean the preparation of beds, or the like to receive insitu pavings by raking with a standard horticultural rake whilst the concrete is still green and when the concrete is set and cured, protecting the raked surfaces with a layer of clean sand and removing the sand immediately before the insitu paving is laid.

F.9 Precast concrete units

Unless otherwise described in the measured items, precast concrete units are deemed to be basically rectangular in cross section and rough on exposed faces. Reinforcement bars shall have hooked ends. Bedding and pointing mortar shall be either cement-sand or cement-lime mortar, as appropriate, and units be deemed to be fixed by hoisting, bedding and building in unless otherwise described.

Nominally non-reinforced units shall contain any reinforcement the Contractor may wish to introduce for handling purpose.

GENERALLY

F.10 Standards

The whole of the concrete works and testing thereof shall comply with BS 8110 parts 1, 2 & 3 and with the subsequent clauses of this Document and shall be carried out in strict accordance with the working drawings and instructions of the Architect and or the Consultant Structural Engineer.

A competent person shall be employed whose first duty it will be to supervise all stages in the preparation and placing of the concrete. All cubes should be made and site tests carried out under his direct supervision. This person shall also be responsible for keeping an accurate record of the dates on which concrete is poured.

F.11 Bar bending schedules

The Consultant Structural Engineer will prepare and provide all necessary bar bending schedules and explanatory details.

MATERIALS

F.12 Samples

Samples of all materials are to be submitted for approval of the Architect at least one week before it is desired to commence deliveries. All condemned materials are to be removed from the site within 24 hours.

F.13 Cement

Cement shall comply with British Standards as follows:

Portland cement	-	B.S. 12
Rapid hardening cement	-	B.S. 12

Except as regards the addition of colorant to BS 1014 which should not exceed 5% of cement by weight

Sulphate resisting Portland cement complies with BS 4027.

Rapid hardening cement may be used in lieu of ordinary Portland cement only with the prior approval of the Architect or Engineer provided that all conditions applying to its use are strictly observed. Any additional expenses in connection with the use of such cement shall be borne by the Contractor.

The use of high alumina cement will not be permitted. All cement shall be delivered to the site in sealed bags bearing the mark of the manufacturer. Re-bagged cement, cement in torn bags will not be allowed on the site.

Each consignment of cement shall be accompanied by the manufacturer's certificate showing that a representative sample of the consignment has been tested and complies with the appropriate specification. From time to time as requested by the Architect/Engineer, copies of the cement manufacturer's test certificates shall be delivered to the Architect/Engineer or his representative on the site promptly, but such documents shall not preclude the Architect or Engineer from rejecting any cement which does not in every way comply with the specification.

Specification

<u>Concrete Work</u>

(2/F/4)

F.13 Cement (Contd)

Any cement, which has failed to pass the tests or has been damaged by water or contaminated in any way on site, shall immediately be put into bags and removed from the site.

F.14 Aggregates

Aggregate shall comply with British Standard as follows:

Fine	-	B.S. 882 Table 2 Zones 1 to 3 only
Coarse	-	B.S. 882 Table 1
"All in"	-	B.S. 882 Tables 3

Each type of aggregate shall be obtained from one approved source, capable of maintaining adequate supplies of consistently graded material throughout the Contract. Aggregates for exposed concrete shall be free from all impurities likely to cause discoloration and shall be of consistent colour throughout the work.

Fine aggregates and sand shall be clean, sharp, coarse, hard material and equal at all times to the samples, which shall be deposited with and approved by the Engineer. The caustic soda test for organic impurities shall show a colour not deeper than that of the standard solution. The settling test for natural sand shall be made and after

being allowed to settle for three hours the layer of silt deposit on the coarse material shall not exceed 10%.

The Contractor shall supply all necessary equipment for the testing of fine aggregates and sand for the use of the Engineer.

Coarse aggregates shall be hard, clean gravel or broken stone from approved quarries and shall be free from earth, decomposed stone, and extraneous matter. They shall conform to B.S. 882 Table 1 and shall be "Grade Aggregate" 19 mm to 5 mm. Thin, elongated, friable, flaky or laminated pieces; mica or shale shall only be present in such small quantities as not to affect adversely the strength and durability of the concrete. The amount of fine particles occurring in a free state or as loose adherent shall not exceed 1% when determined by the laboratory sedimentation test. After twenty-four hours in water, a previously dried sample shall not gain more than 10% in weight.

Each grade of aggregate shall be stored in the works in separate heaps so that there shall be no possibility of any inter-mixing. Any materials which have become inter-mixed shall be removed from the site forthwith by the Contractor.

If, in the opinion of the Engineer, the aggregate is dirty or adulterated in any manner, it shall be washed and/or screened by the Contractor to the satisfaction of the Engineer.

F.15 Reinforcement

Reinforcement shall comply with the following standards:

- a. Mild steel rod reinforcement shall be hot rolled grade 250 complying with B.S.4466 and B.S.4449
- b. (i) hot rolled deformed high tensile bars having a guaranteed minimum yield stress of 460 N/mm² and other physical properties complying with B.S. 4466 and B.S.4449.

Or

- (ii) Cold worked steel bars complying with B.S.4466 and B.S. 4449
- c. Welded steel fabric reinforcement shall comply with B.S.4483

All reinforcement shall be in the "diameter" and metric range and the substitution of "square twisted" or imperial range shall be allowed but only at no extra cost to the Employer

Specification

Concrete Work

(2/F/5)

F.15 Reinforcement (Cont'd.)

The Contractor will be required to submit at his own expense certified test data of the following characteristics; ultimate tensile stress, yield point stress, elongation, cold bend test. Should such certificates not be submitted by the manufacturer, the contractor shall have the requisite tests made at his own expense at an independent testing laboratory.

F.16 Expansion joint materials

Expansion joint material shall be "Flex cell" or other approved bitumen impregnated fibre board.

F.17 Expansion joint sealer

Expansion joint sealer shall be "Sealestik" or other approved cold, gun or knife applied mastic, or "Plastijoint", or "Plastic" grade 88 applied hot. All manufactured by Expedite Ltd. All sealer shall be applied strictly in accordance with the manufacturer's instructions.

F.18 Wall tiles

Where block walls abut columns or solid concrete walls two 6 mm diameter steel reinforcement bar ties are to be cast into the concrete at vertical intervals of 450 mm. Ties to be 300 mm long and project 150 mm into block work.

F.19 Water

Water shall be from the mains and kept free of any impurities and acid or alkaline substances in suspension or in solution, and shall be stored in proper storage tanks to the approval of the Architect.

F.20 Storage of materials

Cement shall be kept dry and used in rotation of deliveries. If delivered in bags these shall be stored off the ground in a well ventilated and weatherproof shed used exclusively for this purpose.

The shed is to be sufficiently large to contain a working stock and provided with partitions or such other means as may be necessary, to ensure the effectual separation of the various consignments and type of cement. Stacking of cement in bags over a height of ten bags will not be permitted. Cement may be delivered in bulk containers provided additional suitable arrangements are made for bulk storage on site to the approval of the Architect/Engineer.

Aggregates shall be stored at mixer positions on drained concrete paved areas, with stout dividing walls between different sizes and types of aggregates. It shall be allowed to stand for at least 24 hours before being used.

Reinforcement shall be stored by type, size and length, either off the ground or on clean surfaced areas, and shall be kept free from rust

F.21 Proportion of concrete mix

The quantity of cement shall be measured by weight and each batch of concrete is to use one or more whole bags. The quantity of fine aggregate and coarse aggregate shall be measured separately by weight batching plant. Volume mixing will not be permitted.

For grading tests the Contractor shall supply and deliver at his own cost to the Nominated Testing Authority, samples of the aggregates which the Contractor proposes to use, consisting of not less than 50 kilograms weight in coarse aggregate and not less than 25 kilograms weighting fine aggregate. (Cont'd.)

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Concrete Work

(2/F/6)

F.21 Proportion of concrete mix (Cont'd.)

It is the Contractor's responsibility to ensure that the subsequent deliveries of aggregate conform to the grading analysis of the approved samples.

The proportions of materials to be used for the preliminary cube tests, and subsequent batching, shall be ascertained by calculation from the results of the aggregate grading tests carried out by the Nominated Testing Authority.

Preliminary concrete cubes shall be made by the Contractor on site, as required by the Engineer, and tested by the Nominated Testing Authority. As a result of these definite weights of each material for batching shall be ascertained and agreed with the Engineer. Thereafter these proportions shall be adhered to throughout the works and may be varied only by instructions given by the Engineer.

The weights of damp aggregates must be adjusted to take into account the weight of water in the aggregates, and this in turn will affect the amount of water to be added to the mix.

Through the carrying out of the Contract, "Works Cube Tests" are to be made from concrete drawn from newly laid concrete or concrete about to be placed in position, such cubes being made when directed by the Engineer and in his presence. Such cubes shall be made in 150 mm cube steel or cast iron moulds and shall be marked and cured strictly in accordance with the Appendices of the code of practice, and shall be forwarded carriage paid in time for testing at the required age to a testing laboratory to be nominated by the Engineer. Four cubes shall be made on each occasion, concrete for each cube being from a different batch. Two cubes shall be

forwarded in time for testing at the age of seven days from casting and two cubes in time for testing in twenty eight days.

Each cubes shall be marked with the date of casting and a distinctive reference number in accordance with a system agreed by the Engineer. A record shall be kept of the position from which the concrete for each set of cubes was drawn, or to which it was about to be placed

At least three sets of cubes shall be cast during each week concrete is being cast including sets of cubes for each quality of concrete used during the period

Concrete is required to have the properties and give the strength in Newton per square millimeter as follows:-

Class	Quality	Max. size of coarse Aggregate	Max water cement ration by Weight	Min crushing strength of Works Test Cubes		
				7 days	28 days	
31.5/20		1:1:2	20 mm	0.45	23	31.5
26.5/20		1:1.5:3	20 mm	0.50	19	26.5
21./20	1:2:4	20 mm	0.58	15.5	21	
21/13	1:2:4	13 mm	0.58	15.5	21	
13.5/25		1:3:6	25 mm	0.60	9	13.50
1:4:8	1:4:8	40 mm	0.60	-	-	
1:10	1:10	"All - in" aggregate		-	-	

Specification
Concrete Work

(2/F/7)

F.21 Proportion of concrete mix (Contd)

The above properties and crushing strengths are to be considered as the minimum standard that will be accepted in the finish at works. The average crushing strengths should be at least 15% higher than the minimum permissible values given in the above table.

If the strength required in the table are not attained and maintained throughout the carrying out of the contract, the contractor will be required to increase the proportion of cement or substitute better aggregates at his own cost so as to give concrete which does comply with the requirements of this clause. The contractor may be required to

remove and replace at his own cost any concrete which fails to attain the required strength as ascertained by the works cube tests.

F.22 Testing of materials generally

The Contractor shall include in his Tender prices for the execution of his part of operations specifications specified for testing herein and for supply of the requisite equipment. After specified initial testing and approval of materials, it is the Contractor's responsibility to ensure and to demonstrate by the submission of further similar samples when so required that subsequent deliveries conform to the quality, grading and (where applicable), colour of the approved samples.

F.23 Testing of cement

Before work commences and when subsequently directed, the Contractor shall take 6kg samples, in accordance with B.S. 12 procedure, of cement and deliver these in tins approved by the Engineer to an approved Testing Laboratory for testing.

Each consignment of cement to the site, which shall be accompanied by the manufacturer's advice note and forwarded without delay to the Engineer, shall be delivered to the site at least 7 days before it is intended to be used in the works so that the required tests may be carried out without retarding the progress of the works.

F.24 Testing of aggregate

Before work commences and when subsequently instructed, the Contractor shall take site sample, by methods given in B.S. 812 and deliver these to the nominated Testing Authority for testing.

Such samples shall be submitted for approved at least 7 days before they are intended to be used in the works.

F.25 Testing of reinforcement

Should the Engineer require reinforcement to be tested, it shall be tested at the Contractor's expense and representative test pieces of such reinforcement to be used in the work are to be sent to an approved laboratory for testing.

Manufacturer's test reports of reinforcement shall be supplied to the Engineer for all reinforcement to be used in the works.

If such tests reveal the steel not meeting the specified standards, the Contractor will carry out the rectifications in the reinforcement to the direction of the Engineer at his own expense.

F.26 Testing of concrete in the field

(i) Trial mixture

Prior to the commencement of the actual concreting work, a trial mix of the required concrete, as described herein shall be made by the Contractor and tested by an approved laboratory at the Contractor's expense, in order to check and establish the actual working crushing strength of the required concrete mix.

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Concrete Work

(2/F/8)

(ii) Workability

The total water content in the mixture determines its consistency and once a consistency of a trial mix has been approved it must remain constant throughout the Contract. In order to help the concrete maintain the desired consistence the slump of an approved trial, mix shall be measured, thereafter all mixes must give the slump as the approved trial mix. The slump shall be determined by test as described in B.S 1881 Parts 102-104,106,107 and DD 83 mm Part 2. In general the approved slump shall be in the order of 75 mm for hand compacted concrete and 35 mm for vibrated concrete. The slump test shall be made on concrete actually being placed in the works at the commencement of each period of concrete and at such other times as instructed.

(iii) Testing specimens

The moulds for test cubes shall be of metal and true to shape to give a 150mm and shall be oiled before filling. The mould shall be filled with concrete taken from that actually placed in the works, the concrete being selected by the Engineer from a point as near as possible to the position of placing. The filling of the moulds shall be done immediately after the selection of the sample concrete and in such a way that the concrete in the moulds be truly representative of that in the works.

The concrete shall be placed in the moulds in three layers of equal thickness, each layer being rammed with 25 strokes of a steel bar 40 mm diameter, (or equivalent), weighing 2 kg. If the concrete in the works be consolidated by mechanical vibration, the test cube moulds shall be likewise vibrated after filling. Each cube shall be inscribed with the date of manufacture and identification mark.

A record shall be kept for each batch of cubes showing the position in the works which the concrete represents, the date of manufacture, the mixture and slump of the concrete, particulars of the cement and aggregate used, a statement of whether or not the cubes are vibrated and other information relating to the subsequent history of the cubes.

The moulds containing the test cubes shall be stored for 24 hours on the site in a damp place free from vibration. At the end of this period the cubes shall be taken from the moulds and stored in damp sand for 20 days if they are to be tested at 28 days or for 4 days if they are to be tested at 7 days.

The Contractor shall be instructed about the dispatch of the cubes to an approved laboratory and will pay all costs relating to the tests. A set of four cubes will be required for not more than every 60 cubic metres of concrete placed in the works.

(iv) Quality of specimens

The test specimens shall have the compressive strength specified for each quality of cement at the appropriate age as given herein.

If the required strength is not obtained at 28 days, the Contractor will be required to cut out and reconstruct all work represented by the test specimen at his own expense with all dispatch, always provided that the Engineer may first permit further tests, at the Contractor's expense, to prove the quality of he deposited concrete.

In the case of seven day works cube tests proving unsatisfactory, the work may be stopped, but shall not be liable to rejection until the result of the twenty eight day test is known.

In the event of the results of the twenty eight day works Cube Tests proving unsatisfactory, the work represented shall be immediately liable to rejection. The contractor may, however, be given the option of cutting three specimens from the completed work subject to the direction of the engineer, and preparing there from test cubes or cores which shall be sent to the Testing Laboratory for testing as for works cube tests

Should the average strength of these specimens attain the specified minimum twenty eight day strength, the work will, subject to the Engineer's discretion, be accepted. (Cont'd.)

Specification
Concrete Work

(2/F/9)

(v) Quality of specimens (Cont'd.)

Alternatively, the Engineer may instruct the Contractor to make a loading test as described hereinafter. The cost off all cutting, preparation of specimens shall be borne by the Contractor. The cost of all delays on site due to concrete not attaining the desired strength, or caused by investigation of defects, cutting away and making good, shall be entirely the Contractor's responsibility

F.27 Damaged or unsatisfactory materials

All materials, which have been damaged, contaminated or have deteriorated, or which do not comply in any way with the requirements of the specification, shall be rejected and shall be immediately removed from the site.

No materials shall be stored or stacked on suspended floors without the Engineer's prior approval.

Should any of the samples tested be found, in the opinion of the Engineer, in any respect unsatisfactory or likely to produce unsound work, the whole parcel, consignment or load from which samples were taken will be rejected, and the contractor shall forthwith remove it from the site. Notwithstanding that any sample of the material may have passed the test, the Engineer may later reject such parcels, consignments or loads if he shall decide that the quality has deteriorated.

The contractor at his own expense shall remove from the site, without delay, all rejected material. Any delay caused by such rejection will not in any way relieve the contractor from his responsibility with regard to the completion within the time limit (s) specified. Any bag of cement that is opened shall be used on the same day or be discarded from the work.

WORKMANSHIP

F.28 Plant and method

Before the commencement of any work, the contractor shall submit the following for the Engineer's written approval:-

- (i) The concreting method, including the size and type of machines for weighing and mixing concrete and the methods of transporting, placing and compacting.
- (ii) Details of formwork proposals, clearly indicating the general method of construction and assembly, the methods of achieving surface finishes required herein, including linings, fixing of linings together with positions of joints and the make and type of mould oil proposed.
- (iii) The proposed position and type of every construction joint not already shown on the Engineer's drawings.

Such approval by the Engineer shall not be deemed to relieve the Contractor of his obligations to comply with any of the provisions herein.

Concrete mixing and discharge from mixers shall be under permanent cover to the Engineer's approval.

F.29 Measurement and mixing

All cement is to be measured by weight, the 50 kg bag of cement being used as a unit.

Specification

Concrete Work

(2/F/10)

F.29 Measurement and mixing (Cont'd.)

The amount of water shall be the minimum required to produce a dense cohesive concrete of adequate workability, to be determined by trial mixes. This amount shall be accurately gauged and adjusted from time to time to compensate for variations in moisture content of the aggregate by an approved method.

All concrete shall be mixed in a batch type mechanical mixer of approved type having a drum rotating about a horizontal or inclined axis. The speed of the drum is to be not more than twenty and not less than fourteen revolutions per minute.

Each mixer is to be fitted with a water measuring device capable of accurate measurement to five litres for one cubic meter mixers and pro rata for smaller sizes and so arranged that the accuracy is not affected by variations in the pressure of the water supply line. The fine and coarse aggregate and the cement shall be mixed for at least four turns, after which the required amount of water shall be added gradually while the mixer is in motion and the concrete mixed for not less than one and a half minutes to uniform colour and consistency.

The volume of concrete mixed in any one batch is not to exceed the rated capacity of the mixer.

The whole of the mixed batch is to be removed before materials for a fresh batch enter the drum.

Concrete as mixed in accordance with the foregoing shall not be modified by the addition of further water or in any other manner. On the cessation of work, including all stoppages exceeding twenty minutes, or any change of type of cement used in the mix, the mixer and all handling plant shall be washed out with clean water.

At least one slump test shall be made each day concreting is in progress, under the supervision of the Engineer.

F.30 Reinforcement

Reinforcement shall be free from all loose mill scale, loose rust, oil, grease or similar defects, immediately before placing the concrete. It shall be bent cold exactly to detail using an approved bending machine. Hooks, bobs, bends, etc. where not, specifically detailed, and are to be in accordance with B.S. 4466 and

B.S. 4449. Each bundle of bent bars shall be clearly tagged with the bar list number.

Reinforcement shall be placed in the exact position shown on drawings with all inter-sections tack welded or securely tied with 16 gauge soft iron tying wire. The designated cover shall be maintained by approved spacers, chairs, bolsters or ties fixed to the reinforcement. These shall be dense concrete left with a wire brushed surface or be dipped in grout before fixing. These blocks are particularly important where the surface of the concrete is exposed to the weather or dampness. The contractor must ensure that the bars are securely fixed so as to maintain their indicated positions during the progress of pouring, tamping or vibration of concrete. Six chairs are to be provided around each column to hold top steel in position and chairs are to be made up of mild steel bars of adequate diameter. The cost of providing and fixing these steel chairs must be allowed for by the contractor in his rates for reinforcement generally. No laps or splices in bars shall be made except for those detailed on the drawings without prior approval of the Engineer.

The size and position of the reinforcing bars or mesh shall be approved by the Engineer before concreting commence. The insertion of reinforcement into concrete already placed the lengthening of bars by welding and the rebinding of incorrectly bent bars will not be permitted.

For concrete having exposed surfaces, reinforcement shall be assembled and placed in such a manner as to avoid any damage to formwork faces.

Where reinforced concrete slabs or walls are constructed against tanking, care shall be taken in positioning reinforcement to avoid damage to tanking.

Unless otherwise shown upon the Engineer's drawings, or specified in **BS 8110**, the reinforcement bars shall be given the following cover to concrete. (Cont'd.)

Specification

<u>Concrete Work</u>

(2/F/11)

F.30 Reinforcement (Cont'd.)

In floor slabs, walls and similar thin paneling, a cover of **20 mm**, or the size of the bar, whichever is the greater. In beams and other such members, a cover of concrete of **30 mm** to the main reinforcement, or the size of the bar, whichever is greater.

In columns, a cover of concrete of **35 mm** to main reinforcement, or the size of the bar, whichever is greater.

In foundations and column bases, a cover of **50 mm** (in dry soil) to main reinforcement or the size of the bar, whichever is greater. Where subsoil water exist a cover of **75 mm** to main reinforcement or the size of the bar, whichever is greater.

F.31 Inspection for reinforcement

When the placing of the reinforcement for particular section of the works is completed and before concreting commences, the reinforcement will be inspected by the Engineer and no concrete shall be placed until the Engineer's approval has been given. The contractor shall give the Engineer 48 hour notice of the time when the reinforcement will be ready for inspection. Where the distance of the site of the works is more than 100 kilometers from the nearest office of the Engineer, this time be increased to 96 hours.

F.32 Formwork

Formwork shall be true to line, level, face and profile and be of robust construction adequately framed, braced, strutted, cramped, tied and propped to restrict deformation due to constructional loads to not more than 3 mm, and to entirely eliminate deformation of the form faces by warping or buckling. Wire ties will not be permitted. Formwork shall be grout - tight under all conditions including vibration when specified or used.

Formwork shall be designed to allow prefabrication of conveniently sized elements to facilities ease of handling and assembly, to permit striking without force shock or any damage whatever to the concrete member or formwork faces and to permit the removal of sides without disturbing soffits and soffits without disturbing necessary props. Propping shall be carried down to an approved bearing, shall not be supported by timber floors and shall be arranged that formwork may be lowered smoothly.

Re-propping will not be permitted. Provision shall be made for cleaning out and draining.

Formwork shall be constructed of material or lined with material as may be necessary to achieve the finishes specified herein and in such a manner as to eliminate screw or nail imperfections.

Before each use, form faces shall be treated with the minimum amount of approved mould oil necessary to obtain a clean release. Mould oil shall not come into contact with the reinforcement.

The use of cement retarders will not be permitted except where a key for other finishes is required.

Before placing of the concrete, bolts and fixing shall be in position and cores and other devices used for forming openings, holes, pockets, recesses, ducts or other cavities shall be fixed to the shuttering. Immediately prior to concreting, formwork shall be thoroughly cleaned out and re-checked. No placing shall commence until the Engineer has inspected the formwork and given his consent for concreting to proceed, but such consent shall not relieve the

contractor of his responsibility for its sufficiency. After striking, formwork shall be cleaned, stacked and protected and before re-use shall be serviced, made good or replaced with new as may be necessary to maintain the finish and standard.

Specification

Concrete Work

(2/F/12)

F.33 Tolerances

The maximum tolerances within concrete work shall be constructed are as follows:-

- | | |
|--|-----------|
| 1. All setting out dimensions, and dimensions
Horizontally and vertically | +/- 5 mm |
| 2. Sections of concrete member | +/- 3 mm |
| 3. Levels of floor slabs, beams, lintels etc
(top and bottom) | +/- 5 mm |
| 4. Plumb of columns and walls in storey height | +/- 5 mm |
| 5. Plumb of columns and walls in full building
Height | +/- 20 mm |
| 6. Inside faces of lift shafts in storey height | +/- 5 mm |
| 7. Inside faces of lifts in full building
Height. | +/- 15 mm |
| 8. Concrete cover to reinforcement | +/- 3 mm |

No surface intended to be horizontal or vertical shall slope more than 2 mm in 1 meter.

Any rectification of work not constructed to the tolerance set out above, shall be entirely at the responsibility and expense of the contractor.

F.34 Placing and compaction

No traffic whatsoever, wheeled or foot, shall take place over reinforcement or placed concrete and the contractor shall provide all necessary stools, walkways, platforms and barrow runs. Concrete shall be placed in its final position as rapidly as practicable by methods which preclude segregation or loss of ingredients and in any case, within 30 minutes from the time that water is added to the mix; compaction shall be completed before initial set commences. Partially set concrete shall not be re-worked or used. "Flowing" in

formwork shall be avoided by placing and compacting in shallow layers in quick succession.

Concrete shall be placed into the forms as less a height as possible and shall in no case be dropped from a height of more than 1500 mm except with the approval of the Engineer.

When chuting is used, the inclination of the chute must be such as to allow the concrete to flow without the use of excessive water and without segregation or loss of the ingredients. Details of any proposed chuting plant must be approved by the Engineer before the plant is delivered to the site.

If the contractor wishes to distribute concrete by means of pumps, full details of the system must be made available to the Engineer for approval.

Concrete shall be thoroughly compacted and carefully worked, with suitable tools, into formwork and round reinforcement and fixtures so as to avoid displacement. A competent steel fixer shall attend throughout concreting to correct any unavoidable displacement.

Compaction shall be by means of vibrations, these shall be of an approved pattern, of the immersion type, and clamp-on external vibrators in adequate numbers shall be used only where the density of reinforcement precludes immersion.

Attachment to reinforcement is expressly forbidden and accidental contact with reinforcement (Cont'd.)

Specification
Concrete Work

(2/F/13)

F.24 Placing and compaction (Cont'd.).

shall be avoided. Vibration shall be executed by a competent operative and shall not be carried out to the detriment of adjacent partly hardened concrete.

An accurate record is to be kept by the contractor showing dates and times when various portions of the work were concreted. The concrete foreman must not vary the approved mix or water content without the permission of the representative of the Engineer. It may occasionally be found that in constricted structural members or where the proportion of reinforcement to concrete is high, the workability of the concrete must be increased locally in order to effect full compaction. Such increase in workability shall be achieved by an increase in the mortar content of not more than 10% of the concrete by weight in any single batch and must be made only with the approval of the representative of the Engineer.

The workability of the concrete must never be altered by the use of additional water or sand stone.

Foundations shall be placed their full depth in one operation and the top surface carefully leveled.

Concrete placed in timbered excavations shall be well rammed closed against the excavation face as the timber is withdrawn.

Where the design of the work demands the placing of reinforced concrete against the sides of excavations without the use of formwork, the earth face in such locations shall be prevented from crumbling or washing into the concrete during placing and compaction by any efficient means, and care shall be taken to maintain the correct cover to the reinforcement.

All concreting shall be continuous to completion or to an approved construction joint.

Methods of placing and vibration generally are to comply with the specifications for vibrated concrete as laid down by the Cement and Concrete Association or the manufacturer of the vibrators used on the works.

During placing of all concrete a workman shall be in constant attendance with a hose pipe to wash off any cement slurry which appears on the face of any previously poured concrete immediately it occurs.

Concrete shall not be poured in forms to a depth exceeding 1500 mm without the prior approval of the Engineer.

F.35 Column Plinths

Column kicker plinths not cast monolithically with the beam or slab will be allowed only at the discretion of the Engineer and special precautions must be taken if permission is granted especially in regard to the quality of the mix used, and the curing of the concrete.

F.36 Blinding concrete

No casting of any concrete on the ground shall take place until the ground has been passed as satisfactory by the Architect. All ground to carry reinforced concrete shall be covered with a blinding layer of concrete 1:10 of the thickness shown on the drawings, or if not so shown, a minimum of 50 mm.

F.37 Waterproof concrete

Wherever waterproof concrete is shown on the drawings it shall be mix 1:1.5:3 nominal and it shall be compacted by mechanical vibration so that a dense and

homogeneous mass of concrete is obtained throughout every pour of the structure.

The Contractor shall be allowed at his own cost to add an approved waterproofing additive to the mix using it strictly according to makers' instructions.

Specification

Concrete Work

(2/F/14)

F.37 Waterproof concrete (Cont'd.)

All permanent construction joints shall be constructed in accordance with the drawings and specifications to achieve complete water tightness.

It shall be the Contractor's responsibility to ensure that all structures required to be constructed in waterproof concrete are completely watertight and any work found to be defective shall be made good to the Architect's satisfaction at the Contractor's expenses.

Where waterproof concrete forms a water retaining structure it is to be tested by filling with water for a period of not less than four days. Any percolation or porous concrete or leaking joint is to be made good at the Constructor's expense. Tanks and pools constructed below ground level are not to be backfilled prior to the satisfactory completion of this test.

F.38 Construction joints

All contraction joints shall be straight, truly vertical or level, as the cast may be, of the profile shown and formed in the exact positions shown on drawings or if not shown on the drawings, with prior approval of the Engineer. Vertical joints shall be formed against adequately secured rigid stop boards having splayed fillets, designed to pass the continuous steel reinforcement without temporary bending or displacement.

The rate and method of placing concrete and the arrangement of constructions joints shall be placed in a continuous operation.

Joints in reinforced slabs, joists and beams, shall be perpendicular to the axis or surface of the member jointed and at the center of the span. If an intersecting member occurs at that point, the joint shall be located at a point of minimum shear.

Construction joints in columns shall be as shown on the drawings. Whenever it becomes necessary to stop work, such stops shall be located at center of slabs and of beams or as directed by the Engineer.

An adequate and acceptable key for succeeding work shall be formed by using stop boards which shall be constructed tightly to prevent any grout leak. As early as possible boards shall be removed and the surface thoroughly hacked and brushed to remove all laitance. Any leakage past stop boards shall be hacked off as soon as the concrete has set. The surface shall be left clean and dry. Immediately prior to further concreting the joint face shall be soaked with water and covered with sand cement mortar of proportions identical to that in the concrete to be placed, punned into the body of the set concrete.

For exposed finishes, care shall be exercised to preserve an unbroken line at the exposed edge of the joint.

In no circumstances shall the concrete be allowed to finish at a break running down a rough slope. Such cases, if found, will be treated as contrary to the specification and the Contractor will be required to cut out the member and re-cast. In the case of horizontal joints, any excess water and laitance shall be removed from the surface after the concrete is deposited and before it has set.

Before casting slabs the haunching or seating for the slab shall be thoroughly hacked, sourced and washed and covered with at least 5 mm of mortar immediately before the slab is cast.

Any necessary construction joints in foundations shall be stepped and lapped 600 mm. Joint faces shall be prepared and treated as described, above

Specification
Concrete Work

(2/F/15)

F.39 Striking times

It shall be the Contractor's responsibility that no distortion, damage overloading or undue deflection is caused to the structure by the striking of formwork, but the Engineer reserve the right to delay the time of striking in the interest of the work. Formwork shall not be struck until the concrete has sufficiently hardened. Approval of the Engineer shall not relieve the Contractor of his liability to make good any concrete damaged by premature removal or collapse of forms. In no circumstances shall forms be struck until the concrete reaches cube strength of at least twice the stress to which the concrete may be subjected at the time of striking. The following striking times given in (24 hours) are the absolute minimum that will be permitted:-

Forms	Ordinary Portland Cement	Rapid Hardening Portland Cement

Wall		
Columns (unloaded) }	2	2

Beam sides		
Slabs –props left under }	4	2
Beam soffits - }	7	5
Props left under		
Slabs – props }		10 5
Beams – props }	18	8

The time for removal of forms as set out shall not apply to slabs and beams spanning more than 10 meters. For such spans appropriate times shall be recommended or advised by the Engineer.

F.40 Curing

The curing of the concrete must receive particularly careful attention. The concrete shall be covered with a layer of sacking, canvas Hessian or suitable absorbent material, and concrete, formwork and covering kept constantly wet for the first seven days after casting.

F.41 Holes and chases and casting in

No holes or chases shall be cut in reinforced concrete works. The Contractor shall ensure that all necessary holes and chases, including fixing for railings and balustrades etc., are carefully formed in the correct position by requisite measures prior to the placing of concrete.

All conduits, pipes, tubes and the like shall unless otherwise detailed, be run on top of the bottom reinforcement of the concrete work. It shall be the Contractor's responsibility to ensure full co-ordination with Sub-Contractors in the setting out for this purpose.

Generally conduits, pipes and special fixtures shall be concreted in where required and in the exact positions demanded.

Concrete fixing blocks shall not affect the strength or cover of the structure nor affect finished work due to movement or other cause.

Details of the positions of all holes, chases and fixing blocks shall be submitted to the Engineer for his approval prior to putting the work in hand.

Specification Concrete Work

(2/F/16)

F.42 Tests of completed structural members

The engineer shall instruct that a loading test be made on the works, or any part thereof, if in his opinion such a test be deemed necessary for one or more of the following reasons:-

- (a) the site-made concrete test cubes failing to attain the specified strength
- (b) the shuttering being prematurely removed
- (c) overloading during construction of the works, or part thereof.
- (d) Concrete improperly cured.
- (e) Any other circumstances attributable to alleged negligence on the part of the Contractor which, in the opinion of the Engineer, may result in the works, or part thereof, being less than the required strength.

If the loading test be instructed to be made solely, or in part, for one or more of the reasons mentioned above, the test shall be made at the Contractor's own cost. If a test be instructed to be made for any other reason than specifically stated above, the contractor shall make the test and shall be reimbursed for all costs relating thereto.

Leading tests are to be in conformity with clause 605 of British Standard Code of practice CP114/1969.

If the result of the loading test be not satisfactory, the engineer shall instruct that the part of the works concerned shall be taken down or removed and reconstructed to comply with this specification, or that such other remedial measures shall be taken as to make the works secure.

If the test be instructed to be made for one or more of the reasons (a) to (e) inclusive as hereinbefore specified, the contractor shall take down or remove and reconstruct the defective work, or shall take the remedial measure instructed, all at his own cost.

F.43 Protection

All insitu and precast concrete shall be protected from rain and during hot, dry and windy weather approved Hessian covering kept constantly damp shall be used to prevent premature drying out. All insitu and precast concrete shall be protected from damage by disturbance, shock vibrations, early loading or overloading. In addition, all exposed finishes shall be constantly protected from mechanical damage to arises or face and damage due to dropping, splashing and staining from any source including rusty scaffolding or reinforcement.

No materials or equipment of any kind shall be stored or stacked on suspended floors without the Engineer's prior approve.

F.44 Precast concrete

Concrete shall all be cast in properly made strong moulds to form shapes required. For work described as “finished fair” the moulds shall be lined with sheet iron or other approved materials.

The coarse aggregate for precast concrete shall be of the sizes described.

The concrete shall be of the mixes described and shall be thoroughly tamped in the moulds and shall not be removed from them until seven days after placing the concrete, but the sides may be removed after three days providing the moulds are such that the sides are easily removable without damaging the concrete.

The precast work shall be cast under sheds and shall remain under same for seven days in the moulds and a further seven days after removal from the moulds. During the whole of this period the concrete shall be shielded by sacking or other approved material kept wet. It shall then be removed from the sheds and stacked in the open for at least seven days to seasons. (Cont'd.)

Specification
Concrete

(2/F/17)

F.44 Precast concrete (Cont'd.)

Precast units shall be true and smooth on all faces (except where a key is required for applied finishes) all arrises shall be true and clean with no broken edges.

All units shall be marked during manufacture to indicate

- (a) the date of casting
- (b) identification lettering in accordance with the drawings
- (c) where necessary, the way up for building in

Ends of bar reinforcement shall be 25 mm from internal faces. Nominally non reinforced units may contain reinforcement at the contractors' option for handling purposes, the cost of which shall be deemed to be included in the contract sum.

F.45 Surface finishes

After removal of shuttering, unless instructed to the contrary, the face of exposed concrete is to be rubbed down immediately to remove fins or other irregularities. In the events of parts of the concrete being honeycombed, such portions are to be cut to a depth and shape required by the Architect and made up with fine concrete of equal quality in such a manner as shall be directed. The faces of concrete for which shuttering is not provided, other than slabs are

to be smoothed with a wooden float to give a finish equal to that of the rubbed-down surface where shuttering is provided.

The top face of a slab which it is not intended to cover with other materials is to be leveled and floated before setting to a smooth finish at the levels or falls shown on the drawings or elsewhere. The floating must be carried out in a way as will prevent an excess of mortar being brought to the surface of the concrete. The top of a slab intended to be surfaced with mortar, granolithic, or similar materials is to be brushed with a stiff broom while still green to remove any laitance and to provide a roughened surface.

(a) Samples

Before the execution of any specified finish, the contractor shall prepare 1200 mm square samples for the Architect's approval. No concreting in finish shall be attempted until the approval of a sample. Approved samples shall be retained until the completion of all such work and closely adhered to throughout the work. Rejected samples shall be demolished and removed.

(b) Rendered or plastered surfaces

Concrete surfaces to be rendered or plastered shall be thoroughly hacked to form a good key.

(c) Fair faced surfaces

Fair faced surfaces shall be free from honeycombing, stains, fins, lip pings, nail hole or excessive air holes and shall be of a uniform colour and texture. This surface shall be obtained by the use of:-

- (i) wrot forms, i.e. timber planed smooth on the surfaces in contact with concrete (ii) forms lined with hardboard or plywood or other approved material: or (iii) smooth steel forms.

All imperfections shall be cut, made good in cement mortar and rubbed down with carborundum stone and finally bag rubbed with cement slurry to finish to a high standard without trace of shuttering marks, joints or other disfigurements.

(d) Board marked finish

Where so described or measured, faces of concrete shall be finished fair by means of 100 mm or 150 mm (nominal) width tongued and grooved boarding of 25 mm (minimum) thickness. The edges to all boards shall have a nominal 2 mm chamfer to form controlled fins. (Cont'd.)

(d) Board marked finish (Contd)

Such formwork to column faces shall be continuous length boards between constructions joints.

End joints will be permitted to beam faces, etc. and shall be tongued, staggered and well distributed.

The resulting concrete shall clearly show grain and individual board marks, be free from honey-combing and excessive air holes, of uniform colour and to the entire satisfaction of the Architect.

F.46 Method of measurement

Prices are to include for working concrete around pipes and electric conduits or cable, including provision for support of same while concrete is placed.

The prices for insitu work are to include for filling into, or on to, formwork where necessary, and where concrete is described as reinforced for well tamping reinforcement. Unless otherwise described, all formwork and reinforcement are measured separately.

Prices for precast concrete work; including items described as precast or insitu, shall include for all moulds, for hoisting and for placing in position, bedding, jointing or building in with cement mortar.

All reinforcing bars are of round section unless otherwise stated and no allowance has, or will be, made for rolling margin.

Prices for holes shall include for them being on rake where so required and shall include the necessary holes through formwork.

The cost of all construction joints, as described herein and not specifically shown on the drawings and measured separately in this Document, shall be deemed to be included in the rates set against the other items in this Document.

The cost of providing all samples described herein shall be deemed to be included in the contract sum.

The cost of performing all tests described herein shall be deemed to be included in the contract sum except the net invoiced cost of testing items or samples at authorized testing laboratories as instructed by the Architect or Engineer, which costs will be reimbursed from the Provisional Sum included elsewhere in this document.

Timber purchased for the fabrication of formwork will be regarded as construction plant and will not be paid for as materials on site.

Specification
Concrete Work

(2/F/19)
WALLING

LIST OF CLAUSES

GENERALLY

- G.1 Testing
- G.2 Samples and sample panels

MATERIALS

- G.3 Cement
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WORKMANSHIP

- G.15 Storage of materials
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-
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Specification

Walling

(2/G/1)

- G.24 Stone pitching
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Specification

Walling

(2/G/2)

WALLING

GENERALLY

G.1 Testing

The Contractor shall, as and when required by the Architect, submit and deliver samples of any materials for testing in accordance with the relevant current B.S. Specification. Samples of mortars, when required, are to be delivered in water tight boxes provided by the Contractor.

G.2 Samples and sample panels

Samples of all types of blocks, bricks and stone required for the works shall be produced to the Architect for his prior written approval before any orders are placed. After approval of samples, the Contractor shall erect a 1200 mm x 1200 mm sample panel of any brickwork, stone work or fair face block work required by the Architect. No work shall be commenced until written approval

has been given to sample panels, which shall be maintained for the duration of the execution of the works to which the sample applies. The work executed shall not be inferior in any respect to the approved by the Architect. The cost of providing samples and sample panels shall be deemed to be included in the Contract Sum.

MATERIALS

G.3 Cement

Cement shall be as described in Concrete Work.

G.4 Fine aggregate

Fine Aggregate for concrete blocks shall be as described in Concrete Work.

G.5 Coarse aggregate

Coarse Aggregate for concrete blocks shall be good, hard, clean aggregate from approved quarries. It shall be free from all decomposed materials and shall be graded up to 10 mm and all as described for coarse aggregate in Concrete Work.

G.6 Limes

Hydrated limes for cement/lime mortar shall comply with B.S. 890, semi hydraulic type 3 calcium limes.

Lime for lime/sand mortar shall comply with B.S. 890 and shall be eminently hydraulic.

G.7 Sand for mortar

Sand for mortar shall comply with B.S. 1200.

G.8 Concrete blocks

Concrete blocks for walling shall be provided by the Contractor complying with B.S. 6073 Type A, and made in approved block making machines of a composition as follows:-

Portland cement	1 cubic metre
Fine Aggregate (graded up to 5 mm)	3 cubic metres
Coarse aggregate (graded up to 10 mm)	6 cubic metres
(Cont'd.)	

Specification

Walling

(2/G/3)

G.8 Concrete blocks (Cont'd.)

Blocks shall be solid or two-hole type as specified and are to be made under sheds erected by the Contractor to the directions and approval of the Architect. Samples shall be approved by the Architect before any walling work is commenced.

The compressive strength of Type A blocks (non loading bearing) shall be not less than:-

Average of 10 blocks	3.5 N/sq.m gross area
Lowest individual block	2.8 N/sq.m gross area

When load bearing, the compressive strength of blocks shall be:-

Average of 10 blocks	7.0 N/sq.m gross area
Lowest individual block	5.6 N/sq.m gross area

All testing shall be in accordance with B.S. 6073.

The concrete is to be put into the machine's moulds in thin layers and all properly tamped therein. On removal from the machines the blocks are to be carefully deposited on racks under sheds erected by the Contractor to the direction and approval of the Architect and there left for three days and kept thoroughly wet the whole time, after which they shall be put out in the open on racks and protected with approved matting, sacking or straw and kept wet for a further five days, then kept in the same position and under same mat cover, but without wetting, for a further two days and then left in the open without matting or wetting for a further seven days to season.

The blocks must be left with good sharp edges. The blocks for use in the works shall be 225 mm high and may vary in length from 300 mm to 450 mm and no variation above or below these lengths will be allowed except where required to form proper bonding at corners, around openings, sills, lintels, beams, etc., and the like positions and the Contractor must make or cut blocks to all the varying sizes required for these purpose and include this in his price.

Blocks to be subsequently covered with an insitu finishing may be slightly rough in texture. Fair face blocks shall be perfectly smooth.

G.9 Load bearing hollow concrete blocks

All load-bearing hollow concrete blocks shall be 225 mm thick x 450 mm long of the two hole type of approved manufacture. The blocks are to have a minimum resistance to crushing at twenty eight days of 4 Newton per square millimetre on their net area.

The volume of the cavities shall be not less than 45% and not more than 50% of the gross volume, and the dimensions of the cavities arranged so that each cavity is vertically continuous when the blocks are bonded.

G.10 Precast concrete louver or screen blocks

Precast concrete louver or screen blocks shall comply in all respects with the specification for precast items contained in the preambles to 'Concrete Work', and shall be constructed to the dimensions and form shown in the drawings.

G.11 Clay Bricks

All clay bricks shall be obtained from a manufacturing source specified by the Architect in writing, or where not so specified, approved by him in writing, and complying with BS 3921.

All bricks incorporated into the works shall be properly burnt, clean, and hard, of well defined arris, uniform in shape and as near uniform in colour as possible. Bricks to be used for face work shall be selected to the Architect's approval.

Specification

Walling

(2/G/4)

G.12 Hollow clay screen blocks

Hollow clay screen blocks shall be from an approved manufacturer to the pattern and dimensions described, free from flaws, chips etc., with completely clean arrises incorporated into the finished work.

G.13 Stone for pitching

Stone for pitching shall be hard clean sound local stone to the approval of the Architect, of size and shape to give a 230 mm x 230 mm bearing surface when placed.

G.14 Stone for walling

Stone for walling shall be hard clean and sound local stone from an approved quarry to the approval of the Architect.

WORKMANSHIP

G.15 Storage of materials

Cements and limes shall be stored off the ground, under cover and away from damp, and in such manner to enable them to be used in rotation in order of delivery.

Sands shall be stored separately according to type on clean, hard dry standing and protected from contamination.

Sands for pointing shall be stored separately, away from other sands and shall be obtained in sufficient quantity at one time to enable materials or the approved colour to be used for the whole of the work.

Precast concrete blocks and louver or grille blocks and clay bricks and blocks shall be open stacked to permit ventilation and protected from the sun, rain and rising damp.

G.16 Wetting blocks and bricks

Concrete blocks and louver or grille blocks and clay bricks and blocks shall be wetted as necessary before and after laying. Walls shall be kept wetted for three days after building.

G.17 Bonding walling

The blocks shall be properly bonded together and in such manner that no vertical joint in any one course shall be within 115 mm of a similar joint in the courses immediately above or below. Sufficient through bonders shall be provided as directed by the Architect. Alternative courses of walling at all angles and intersections shall be carried through the full thickness of the adjoining walls. All walling shall be built up entirely solid in blocks, without voids, allowance being made for joints 10 mm thick only. All perpend; reveals and other angles of the walling shall be built strictly true and square.

G.18 Generally

The Contractor shall provide all setting out rods.

All surfaces on which blockwork or brickwork is to be built shall be clean. All blockwork and brickwork shall be built uniform, true and level, with all perpend vertical and in line. No work shall rise more than 1 metre above adjoining works and all such risings are to be properly racked back in long steps to prevent cracks arising, and all walls shall be leveled around at each floor.

Joints generally are not to exceed 10 mm in thickness. Cutting of blockwork against concrete soffits, etc., shall include for cutting to give normal 10 mm joints and compete filling thereof with mortar. (Cont'd.)

Specification
Walling

G.18 Generally (Cont'd.)

All walls built in hollow concrete blocks, where finishing with an open top edge, (i.e. not against ceiling, beam, etc.), or at the underside of sills, shall be finished with a solid concrete block top course.

Where walling is to be fair faced in blocks, the blocks shall be selected and shall all have clean arrises.

G.19 Wall reinforcement

Where so specified hollow block walls shall be reinforced vertically with 10 mm diameter mild steel bars or 6 mm square twisted bars at 450 mm centres unless otherwise specified, the bars being tied in with the reinforcement of the floors at the top and bottom in an approved manner.

No scheduled for steel in walls will be provided.

G.20 Mortar mixing

All materials shall be accurately gauged by gauge boxes and mechanically mixed and used within 30 minutes of first mixing. Proportions shall be cement and sand (1:6) by volume.

Re-tempering of mortar will not be permitted. Gauge boxes and mixers shall be kept clean.

G.21 Bedding and pointing

All blocks shall be bedded on a solid bed of mortar; vertical faces of all blocks shall be well buttered before being laid and the whole well grouted at each course. Joints to blockwork to be plastered shall be roughly raked out to form a key. Joints to fair face blockwork shall be either finished flush or finished recessed 6 mm as hereafter specified.

G.22 Laying louver or screen blocks

Louver or screen blocks shall be built in mortar with all joints flushed up, surplus mortar wiped from the face of the blocks and finished fair.

G.23 Filling of blockwork cavities

All cavities where specified and shown above ground and all cavities below ground level shall be filled in solid with concrete of the mix described and placed and consolidated in sections not exceeding 1125 mm in height.

G.24 Stone pitching

The ground to receive pitching shall be well compacted and the stone; which shall be flat bedded and not less than 230 mm either way along the bearing surface, shall be punned to the required falls and inclinations so that neither wedges nor spalls are required to keep the pitching rigidly in place. The joints shall be no more than 13 mm thick solidly filled with 1:3 cement mortar and pointed.

G.25 Stone walling

The stone shall be well bonded with a minimum of one good bond or through stone evenly spaced to each square metre. All cavities and joints in stonework are to be filled in and flushed up solid with mortar.

Jointing and pointing is as detailed or instructed.

G.26 Putlog holes

Putlog holes shall be carefully, properly and completely filled up on completion of walling work.

Specification

Walling

(2/G/6)

G.27 Chases

Where walling is cut, holed or chased for conduits, pipes or the like, all such chases shall be filled in solid with cement mortar mix (1:4) prior to the application of finishes. In no case shall the vertical chase be deeper than one third the thickness of the wall and in no case shall the horizontal chase be deeper than one sixth the thickness of the wall.

G.28 Method of measurement

Prices for holes and chases shall include for cutting or leaving such holes or chases as may be required and the prices shall include for holes being on rake where necessary.

Specification

Walling

(2/G/7)

ROOFING
LIST OF CLAUSES

TILE ROOFING

K.1 Bituminous felt underlay

K.2 Saflok700 metal sheets

K.3 Mbezi interlocking tiles

K.4 Examine roof coverings

CORRUGATED OR TROUGHED SHEET ROOFING

K.5 Sheet roofing generally

K.6 Profiled aluminium sheet roofing

K.7 Asbestos cement sheet roofing

BITUMINOUS FELT ROOFING

K.8 Approved subcontractor

K.9 Guarantee

K.10 Samples

K.11 Preparations of surfaces

K.12 Pipes to be laid beforehand

K.13 Built – in roofing

K.14 Air pockets and stains

K.15 Test for falls

K.16 Protection

Specification

Roofing

(2/K/1)

ROOFING

TILE ROOFING

K.1 Bituminous underlay

Bituminous felt underlay to ridges etc., to be self finished felt weighing not less than 14 kg. Per 10 square meter with 600 mm laps at joints and nailed with galvanized steel nails as above.

K.2 Examine roof coverings

Before delivering up the works, examine the roof covering and leave the roofs clean, watertight and drop dry.

CORRUGATED OR TROUGHED SHEET ROOFING

K.3 Sheet roofing generally

All sheet coverings shall be laid away from the prevailing weather i.e. the exposed edge of the top most sheets to be on its leeward side.

K.4 Saflok700; Profiled metal sheet roofing

- (i) Profiled metal sheets are to comply with BS 4868 and are to be colour coated by the manufacturer after formation and of the gauges specified, laid with one and a half corrugation side laps and 150 mm ends laps. Sheets are to be properly stacked inclined to facilitate run-off rainwater.
- (ii) Fixing corrugated steel sheeting is to be by means of 14 gauge drive screws in the case of a timber roof supporting structure, and 6 mm galvanized hook bolts in the case of a steel supporting structure.

Both types of fixing to incorporate a bituminous felt washer backed by a cranked diamond shaped aluminium washer immediately below the screw or nut whichever the case may be.

Each sheet is to have a minimum of two fixings and the holes for the bolts or screws are to be drilled through the crown of the corrugation and be of such size so as to give a 0.80 mm clearance on the bolt or screw.

- (iii) Colour coated roofing sheets are to be finished to an approved colour by spraying and oven at the manufacturer's works. Care is to be taken to avoid damage to the finish and small scratches and blemishes are to be touched up on site with paint supplied by the manufacturer of the sheets. Sheets with large scratches are to be returned to the supplier for refinishing or are to be replaced.
- (iv) Accessories are to be obtained from the same supplier as the roof sheeting and are to properly match the colour of the roof sheeting.

K.6 Asbestos cement sheet roofing

- (i) Corrugated asbestos cement sheets, accessories and fixings shall comply with BS 5247 and be as manufactured by Asbesco Ltd. Sheets are to be stacked on a smooth, level foundation, under cover, on cross battens, two per sheet up to 1500 mm long and three for sheets over 1500 mm. Stacking is not to exceed 1200 mm high without battens and a maximum of 3000 mm with battens every 500 mm.

-
- (ii) Fixing asbestos cement sheeting is to be by means of bolts, hook bolts or roofing screws with PVC caps and "Seal washers", all to be obtained from Asbesco Ltd.

All sheets are to be drilled and no other method for forming the holes through the crown of the corrugations will be allowed.

Specification
Roofing

(2/K/2)

No fixing whether for a roof sheet or an accessory should be nearer than 40 mm to any edge of the member.

- (i) In order to provide close fitting of the sheets two diagonally opposite corners of each sheet are to be mitred. For sheets laid from left to right, miter the bottom right hand and top left hand corners, and for sheets laid from right to left, meter the bottom left hand and to right hand corners.

BITUMINOUS FELT ROOFING

K.7 Approved Subcontractor

The Contractor is required to arrange for the work to be executed complete and to the entire satisfaction of the Architect by an approved Subcontractor.

K.8 Guarantee

The Contractor shall obtain from the approved Subcontractor for roofing work and deposit with the Architect, a written guarantee and undertaking to the effect that during a period of twelve calendar months from and after the certified date of completion of the whole of the works such subcontractor shall at his own expense make good to the satisfaction of the Architect all and any defects in the work which shall be attributed to improper materials or faulty workmanship and shall bear the cost of any consequential damage as shall be provided for in such guarantee.

K.9 Samples

The contractor shall, when required by the Architect, submit samples of any materials for testing

K.10 Preparation of surface

All surfaces to receive roofing are to be dry, rough and finished to the requirement and to the entire satisfaction of the Subcontractor from whom the Contractor shall obtain, for submission to the Architect, a signed statement that such finish is satisfactory.

K.11 Pipes to be laid beforehand

The contractor must ensure that all necessary plumbing, outlets, etc., and pipes, passing through roofs are fixed in position before laying is commenced.

K.12 Built-up roofing

- (i) The built-up felt roofing shall be in accordance with B.S 747. Applied to a screeded base and shall comprise the following applications laid strictly in accordance with the manufacturer's printed instructions and the code of practice 144 of 1961.

K.12 Built-up roofing

- (ii) Rolls must be transported and stored on end one roll high and adequately protected from the sun.

(iii) One layer finish

- | | |
|--|--|
| (a) Priming | Prime screed with P.F.4 primer. |
| (b) Finishing
Coat (Class 1C) | one layer of heavy duty self finished felt
weighing not less than 25 kg/10 SM |
| (c) Jointing
compound weighing not less | one application of hot bituminous
than 30 kg/10 SM |

Specification
Roofing

(2/K/3)

(iv) Two layer finish

- | | |
|--------------------------------------|--|
| (a) Priming | Prime screed with P.F. 4 prime |
| (b) | First layer one layer of heavy duty self-
finished felt Weighing not less than 14 (Class 1B) kg14/10 SM laid
loose on prepared screed. |
| (c) Jointing
compound
Compound | one application of hot bituminous
weighing not less than 30 kg/10 SM. |
| (d) Second layer
(Class 1C) | one layer of heavy duty self finished felt
weighing not less than 25 kg/10 SM. |

(v) Three layer finish

-
- | | |
|-----------------------------|--|
| (a) Priming | Prime screed with P.F.4 primer. |
| (b) First layer | one layer of heavy duty self finished felt weighing not less (Class 1B) than 14 kg/10 SM. laid loose on prepared screed. |
| (c) Jointing | one application of hot bituminous compound weighing not less compound than 30 kg/10 SM. |
| (d) Second layer (Class 1B) | one layer of heavy duty self-finished felt weighing not less than 14 kg/10 SM |
| (e) Jointing | as described in (c) above. |
| (f) Third layer (Class 1C) | one layer of heavy duty self finished felt weighing not less than 25 kg/10 SM. |
- (vi) Stone chipping finish. The entire surface to be mopped with not bituminous compound and felt overnight and followed with a layer of 6 -12 mm white stone chippings bedded in mastic applied to the entire area and lightly rolled.
- (vii) Flashings, skirting etc., are to be painted two coats bituminised aluminium paint on completion.

K.13 Air pockets and stains

Air pockets and stains will not be permitted and the finished work shall not ring hollow over any part of its surfaces.

K.14 Test for falls

To ensure that the finish has been truly laid to falls, (minimum 1:200), the Contractor shall arrange for the roof areas to be flushed with water in the presence of the Architect. Any defects or depressions shall be rectified and retested for approval.

K.15 Protection

The Contractor shall take all necessary precautions to ensure that no damage is caused to be the roofing after completion of laying by further building operations, storage of heavy objects, traffic or any cause whatsoever.

Specification

Roofing

(2/K/4)

CARPENTRY AND JOINERY

LIST OF CLAUSES

QUALIFICATIONS OF THE RULES OF THE SM.M

- M.1 Holes in timber
- M.2 Fixing by bolting, etc
- M.3 Fixing ironmongery

DEFINITION

- M.4 Plugging
- M.5 Finished sizes
- M.6 Selected
- M.7 Hardwood or the like

MATERIALS

- M.8 Terminology
- M.9 Timber generally
- M.10 Approval
- M.11 Species of timber
- M.12 Plywood
- M.13 Chipboard
- M.14 Block board
- M.15 Fibreboard
- M.16 Hardboard
- M.17 Laminated plastic

M.18 Pressure impregnation treatment

M.19 Screws, nails, bolts etc

M.20 Adhesive

WORKMANSHIP

M.21 Generally

M.22 Contractor to check discrepancies

Specification

Carpentry and Joinery

(2/M/1)

M.23 Storage

M.24 Priming

M.25 Arrises

M.26 Fabrication

M.27 Fixing fiberboard, hardboard and chipboard

M.28 Fixing laminated plastic

M.29 Plugs

M.30 Nailing and screwing

M.31 Joints in structural timbers

M.32 Lapping to block board

M.33 Fixing panels with beads

M.34 Flush doors

M.35 Inspection and testing

M.36 Casing and protection

M.37 Clearing up

IRONMONGERY

M.38 Generally

M.39 References

M.40 Fixing

M.41 Keys and labels

M.42 Method of measurement

Specification

Carpentry and Joinery

(2/M/2)

CARPENTRY AND JOINERY

QUALIFICATIONS OF THE RULES OF THE SMM

M.1 Holes in timber

Notwithstanding the provisions of SMM clause M.38 (a), where work is described as fixed with screws, holes in timber shall be deemed to be included.

M.2 Fixing by bolting, etc.

Notwithstanding the provisions of SMM Clause A.3 (B) (iii), the term 'fixing up' used in conjunction with any method of fixing shall not be definition of fixing with bolts or other devices shall be deemed to be included where these are normally supplied with the ironmongery concerned.

DEFINITIONS

M.4 Plugging

The term 'plugging' shall mean the provision and fixing or approved proprietary plugs of the correct grade, hardwood plugs cut to twist, or dovetailed plugs mortised into the walls.

M.5 Finished sizes

All members shall be finished to the size stated or shown on the drawing. The prices inserted by the contractor shall be deemed to include for the nominal sizes necessary to produce the finished sizes stated.

M.6 Selected

The term 'selected' shall be deemed to include keeping the material so described clean for staining, polishing, or any similar finish.

M.7 Hardwood or the like

The term 'hardwood or the like', which is used a statement of background to which ironmongery is to be fixed, shall be deemed to include plywood and other manufactured materials, except where these materials are faced with metal, laminated plastics or the like.

MATERIALS

M.8 Terminology

All technical terms shall be as defined in the relevant timber ordinances.

M.9 Timber generally

Timber shall be from an approved sawmill, be sound, well conditioned, properly seasoned to suit the particular use, straight grained, and free from defects or combination of defects rendering it unsuitable for the purpose intended, and containing not more than 15% moisture for joinery work or 18% moisture for carpentry work.

Structural timber is to be approved local softwood or hardwood as specified of strength grade two supplied in long lengths, with a tolerance of 5mm on scantlings, but of uniform width and thickness. Boards and scantings which are specified as 25mm or less in thickness are to hold up to full size. Structural timber shall be deemed to be sawn on all faces unless otherwise stated as wrot. (Cont'd.)

Specification

Carpentry and Joinery

(2/M/3)

M.9 Timber generally (Cont'd.)

Joinery timber shall be approved prime selected grade local hardwood as specified and shall be held to be wrot by machine dressing unless otherwise stated.

All timber for the works is to be purchased immediately the contract is signed and is to be open stacked for as long as possible before use or kiln drying. All timber and assembled woodwork shall be protected from weather and stored in such a way as to prevent attack by termites, insects or decayed fungi.

M.10 Approval

Any timber brought to the site and rejected by the Architect, shall be removed from the site at the Contractor's expense.

Should any timber be found to contain disease, pest, borers, termites, or any other defect after incorporation in the work, and until the expiration of the

maintenance period, notwithstanding that the timber may have been approved by the Architect when brought to the site, such timber shall be removed and replaced, together with all works disturbed, at the Contractor's expense.

No timber is to be incorporated in the building which has been used for formwork, planking, strutting, scaffolding, or any other form of plant.

M.11 Species of timber

The following timbers shall be used where specified and the common names used throughout this document correspond to the botanical names as follows:

<u>Common Name</u>	<u>Botanical Name</u>
Pine	Pinus Patula
Cypress	Cypressus lusitana
Podocarpus	Podocarpus spp
African Mahogany	Khaya nyasica
Mninga	Pterocarpus Angolensis
Mvule	Chlorophora excelsa

The following may also be used where "hardwood" or "hardwood" is specified, with the Architects prior written approval; Adina, East African Afromosia, East African Afzelia, Mgando, Banda Wanga, Muhuhu, Camphor and Burkea.

M.12 Plywood

The plywood shall be from a manufacturing source approved by the Architect and shall comply in all respects with the requirements of B.S. 66566.

Grade 1 veneer plywood shall be used visible surface is to be wax polished, varnished, plastic lacquered or left untreated.

Grade 2 veneer plywood shall be used where subsequent painting is intended.

All plywood shall be WBP bonded, and of marine quality when specified.

Routine tests will be required from time to time to check the quality of plywood manufacture.

Specification

Carpentry and Joinery

(2/M/4)

M.13 Chipboard

Chipboard shall comply with B.S. 5669

M.14 Block board

Block board shall be from a manufacturing source approved by the Architect and shall comply in all respects with B.S. 3444. The grade of the veneer shall be as described in the measured items.

M.15 Fiberboard

Fiberboard shall be Celotex, or other equal and approved make, of the thickness specified and complying in all respects with the requirements of B.S. 1142 Part 3.

M.16 Hardboard

Hardboard shall comply with B.S. 1142 Part 2 and be tempered.

M.17 Laminated plastic sheet

Laminated plastic sheet shall comply with B.S. 3794 Class 1; from an approved manufacturer. Prior to fixing laminated plastic sheet the Contractor shall obtain the Architects written approval to a sample.

M.18 Pressure impregnated treatment

All timber used in carpentry, grounds for fixing joinery, etc., is to be vacuum pressure impregnated with Tanalith C preservative to a dry salt net retention of 10 kg of Tanalith C per cubic meter of timber and stacked until the moisture content returns to 18% or 15% as above described.

Timber to be machined to finished sections and cut to component length before impregnation.

Cut ends, notching, boring, and faces of timber sawn after treatment are to be swabbed liberally with Wolmanol end grain preservative, allowed to dry, and then applied in a similar manner a second time. The Contractor's prices for such timber must allow for this treatment.

M.19 Screws, nails, bolts, etc.

Screws, shall comply with B.S. 1210 and nails with B.S. 1202. Bolts shall be generally cup square with large washers and nuts.

Other fixing accessories are to comply with B.S. 1494.

M.20 Adhesive

Adhesive shall be synthetic resin type complying with B.S. 1204. Part 1, type WBP.

WORKMANSHIP

M.21 Generally

Workmanship shall comply with B.S 1186 Part 2.

M.22 Contractor to check discrepancies

The contractor shall be responsible for ascertaining from the site and for checking all dimensions before the joinery is put in hand. Any discrepancies between site dimensions and those shown on the Architect's drawings shall be reported immediately to the Architect for rectification.

Specification

Carpentry and Joinery

(2/M/5)

M.23 Storage

Joinery shall be protected from the weather during transit and shall be stored under cover, clear of the ground, in clean, dry ventilated structures, before and after priming.

M.24 Priming

All joinery shall be delivered to the site unprimed and shall be primed, (as measured in Painting and Decorating), immediately after inspection and before fixing.

M.25 Arrises

All arrises exposed in the finished work shall be rubbed down with glass paper.

M.26 Fabrication

All joinery is to be purpose made and constructed to detail drawings, in a workmanlike manner, morticed, and tenoned, dovetailed, tongued and grooved, glued, pinned, screwed, etc., as best suited to the particular part. All mortice and tenon joints are to be pinned with hardwood dowels or with brass pins in addition to wedging and gluing. All joinery shall be put together with waterproof adhesive.

All carpenter's work shall be accurately set out in strict accordance with the drawings and shall be framed together and secured fixed in the best possible

manner with properly made joints. All necessary brads, nails and screws, etc., shall be provided as directed and approved.

M.27 Fixing fibreboard, hardboard and chipboard

Unless otherwise specified fibreboard hardboard and chipboard, shall be pinned to its backing, heads punched below the surface and puttied flush.

M.28 Fixing laminated plastic

Laminated plastic shall be fixed with an adhesive recommended by the manufacturer, and in accordance with their instructions.

M.29 Plugs

The centers of fixing plugs shall not exceed 600 mm and shall be closer if the work so requires.

M.30 Nailing and screwing

Where items are described as 'fixed with screws' they shall be brass screws of the appropriate gauge and length, countersunk and pellated where applicable . In all other instances wrot timber shall be fixed with oval brads, round lost heads or cut clasp nails punched and puttied; carcassing timber shall be spiked, well driven and clenched.

M.31 Joints in structural timbers

Structural timbers shall as far as is practicable be in single lengths. Where joints are unavoidable they shall be scar fed, spiked and bolted as required. Generally scarfs shall be 450 mm long.

Bolt holes should be drilled to diameters as close as possible to the nominal diameter of the bolt and in no case more than 1.6 mm larger than the bolt diameter. Care should be taken to avoid placing a bolt in any end split. A minimum of one complete thread should protrude from the nut. A washer should be fitted under the head of each bolt and under each nut. The minimum sizes of washers are given below:-
(Cont'd.)

Specification

Carpentry and Joinery

(2/M/6)

M.31 Joints in structural timbers (Cont'd.)

Diameter of bolt of washer	Minimum thickness square or diameter	Minimum size of square or diameter of washer of washer
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10 to 12 mm	3 mm	50 mm
6 to 22 mm	5 mm	65 mm
25 to 32 mm	6 mm	75 mm

M.32 Lipping to block board

All exposed edges of block board, including those to be covered with Formica, shall be lipped with a hardwood lipping to the size specified for the full thickness of the board to match the veneer of the general face. Lip pings shall be fixed with pins of the appropriate gauge and length, punched and puttied. Where described as 'tongued', the edge of the block board shall be grooved to receive the lipping which shall be rebated twice to form the tongue.

M.33 Fixing panels with beads

Where glass or other panels are fixed with beads, and may be required to be removed or replaced in the event of breakage, the beads shall, where fixed to one side only, be fixed with brass screws and cups, and where fixed to both sides, be braded one size and fixed with brass screws and cups one the other side. Brass screws and cups shall only be used internally.

M.34 Flush doors shall be of the sizes and thickness indicated on the drawings.

The doors, unless otherwise described, shall be semi-solid cored having stiles, top and bottom rails, filled in with core slats at approximately 50 mm centers, or slats to an egg crate pattern.

Doors intended for interior or exterior use shall be faced on both sides with 6 mm exterior marine quality plywood with the grade of veneer as specified in the measured items.

All flush doors shall have lipped edges. The members of all doors shall be bonded with the same adhesive as is required for the bonding of the plywood with which they are faced.

No flush doors shall be incorporated in the works without first obtaining the Architect's approval of a sample

M.35 Inspection and testing

The Architect shall be given facilities for inspection of all works in progress whether in workshops or on site. All timber as it arrives on the site may be inspected by the Architect and any timber brought on to the site and not approved by him must be removed forthwith, failing which he may arrange for the removal of the rejects and dispose of them as he may consider advisable at the Contractor's expense

Notwithstanding approval having been given as above, any timber incorporated in the works found to be in any way defective before the expiry of the maintenance period shall be removed and renewed at the Contractor's expense. The contractor is to allow for testing of prototypes or special construction units and the Architect shall be at liberty to select any samples he may require for the purpose of testing, i.e. for moisture content, or identification or species, strength, etc. Where timbers need to be extended into a wall, they shall be (Contd)

Specification

Carpentry and Joinery

(2/M/7)

M.35 Inspection and testing (Contd)

thoroughly "brush treated" with "Tanalith" in addition to preservative treatment as already described above, and as much clear air space maintained around the timber where it adjoins the wall as possible.

M.36 Casings and Protection

All fixed joinery which is liable to become bruised or damaged in any way, shall be properly cased and protected by the contractor until the completion of the works.

M.37. Clearing up

The contractor is to clear out and destroy or remove all cut ends shavings and other wood waste from all parts of the building and the site generally, as the work progresses and at the conclusion of the works

IRONMONGERY

M.38 References

Where items of ironmongery are not specified by manufacturers' catalogue reference, the Contractor shall submit for the Architect's approval within one month of the date of possession of site, specifications including manufacturers catalogue reference number of the items he proposes to purchase.

Prior to fixing any item of ironmongery, the Contractor shall obtain the Architect's approval of a sample

M.40 Fixing

Joinery is to be countersunk for ironmongery and screws. Where woodwork is painted, the ironmongery shall be fixed while the joinery is primed but before painting. All lock handles and the like shall be removed until after painting is

complete when they will be fitted and adjusted and left in perfect working order.

M.41 Keys and labels

All locks are to be provided with two keys and no key is to pass the wards of any but its own lock. All keys are to be provided with a key ring and plastic tag on which is firmly written the position of the door.

M.42 Method of measurement

Fixing shall include all fitting, cutting, sinking, boring and mortising, easing and adjusting.

Specification

Carpentry and Joinery

(2/M/8)

STRUCTURAL STEELWORK

LIST OF CLAUSES

GENERALLY

- N.1 Standard of construction
- N.2 Fabrication by specialist firm
- N.3 Contractor to submit drawings
- N.4 Accuracy of drawings
- N.5 Erection scheme
- N.6 Dimension to be verified
- N.7 Copies of orders
- N.8 Damages

MATERIALS

- N.9 Quality of steel
- N.10 Marking of steel
- N.11 Standard dimensions
- N.12 Weight of steel

N.13 Conditions of surface

N.14 Tests and inspection

N.15 Metallic coatings

N.16 Paint

WORKMANSHIP

N.17 Generally

N.18 Rejection

N.19 Fabrication

N.20 Cost of temporary erection, etc

N.21 Joints and connections

N.22 Painting at work

Specification

Structural steelwork

(2/N/1)

STRUCTURAL STEELWORK

GENERALLY

N.1 Standard of construction

The whole of the structural steelwork and testing shall comply with the relevant clauses of B.S. 449 and B.S. 5950.

N.2 Fabrication by specialist firm

The steelwork shall be fabricated by a specialist firm and, before an order is placed by the Contractor; such specialist firm shall be approved by the Architect.

N.3 Contractor to submit drawings

The Contractor shall include for the preparation of all shop details from the drawings supplied by the Architect. All such details shall be approved in writing by the Architect before the work is put in hand. Every drawing shall show the number and sizes of all bolts, complete details of welds, and type of

electrodes, welding procedure, whether the welds are to be made in the shop or elsewhere and any other relevant information.

N.4 Accuracy of drawings

The Contractor shall be responsible for the correctness of his shop details, for shop fittings and site connections.

N.5 Erection scheme

The Contractor shall submit to the Architect for approval, drawings showing the proposed erection scheme, together with all calculation for erection stresses, etc. The approval by the Architect will not absolve the Contractor in any way from responsibility.

N.6 Dimensions to be verified

The Contractor shall take the dimensions from the site or buildings and shall verify all dimensions given on the drawings before the work is put in hand.

N.7 Copies of orders

A copy of all orders for materials shall be supplied by the Contractor to the Architect at the time of ordering, for identification purposes.

N.8 Damage

Any damage to materials on the site due to inadequate precautions being taken during the erection of the steelwork shall be made good to the satisfaction of the Architect at the Contractor's expense.

Specification

Structural Steelwork

(2/N/2)

MATERIALS

N.9 Quality of steel

- (i) All structural mild steel shall comply with B.S 4360 Part 2.
- (ii) All structural steel tubes shall comply with B.S 6323 and B.S 449 Part 2.
- (iii) Mild steel and medium tensile steel electrodes for metal-arc welding shall comply with the requirements of B.S. 639.
- (v) High strength friction grip bolts and washers shall comply with B.S 4395 Part 1.

N.10 Marking of steel

Each pieces of steel shall be legibly marked with the maker's name or trade mark and with cast numbers or identification marks.

- N.1 Standard dimensions and allied requirements of all structural rolled sections shall comply with B.S. 4 Part 1 and B.S.4848. The dimensions, weight, tolerances, etc., of all bolts, nuts, studs, etc., shall conform to the following standards:

Black bolts shall have the shank turned to the specified diameter allowing only a minus tolerance up to 0.13 mm.

N.12 Weight of steel

For the purpose of measurement, the weight of mild steel shall be as given in B.S 648. The weights per meter given on the drawings do not include shelf angles affixed to webs, nor plates affixed to flanges of Universal beams or other sections.

N.13 Condition of surfaces

All surfaces of steelwork shall be clean, free from loose mill scale and rust.

N.14 Tests and inspection

Manufacturer's Mill Test certificates for all structural steel shall be supplied to the Architect; the Contractor shall take and deliver samples of structural steel for testing to a testing facility nominated by the Architect. Should the results of any test be unsatisfactory the whole consignment of steel which the sample represents shall be rejected and shall be replaced by other material of proper quality at the expense of the Contractor.

N.15 Metallic coating

- (i) Galvanized steelwork shall comply with B.S 729, entirely coated with zinc after fabrication by complete immersion in zinc both in one operation and excess carefully removed. The finished surfaces shall be clean and uniform.
- (ii) Zinc sprayed steelwork shall comply with B.S 2569, Part 1. the nominal thickness of zinc coating shall be not more than 0.102 mm and at no point less than 0.070 mm.

N.16 Paint

Prime for steelwork shall be calcium plumbate priming paint complying with B.S. 3698, Type A. Bituminous paint shall be black bituminous paint complying with B.S 3416, type 1.

Specification

Structural Steelwork

(2/N/3)

WORKMANSHIP

N.17 Generally

The whole of the fabrication and erection of the steelwork shall be carried out in accordance with B.S 449 Part 2.

The welding of steel to B.S. 4360 Part 2 must conform to:

B.S. 5135 - "General requirements for the metal - arc welding of mild steel" as applicable.

For welding any particular type of joint the contractor shall provide evidence acceptable to the Architect that the welder has satisfactorily completed the appropriate tests as described in B.S. 449, Part 2. Any welder's tests shall be made at the Contractor's expense and shall include the cost of any fees incurred by the Employer for witnessing of, or making such tests. The right is reserved to make non-destructive tests on the welding to determine if the welding conforms to the standards laid down in B.S 5135 as applicable.

N.18 Rejection

Any portion of the work which, in the opinion of the Architect is not in accordance with the drawings or specification shall be rejected whether before or after delivery and must be removed, from the site if delivered, within 24 hours from receipt of such notice of rejection at the Contractor's expense. Any delay caused by such rejection will not in any way relieve the Contractor from his responsibility with regard to the provisions of the Contract. If any welding is found to be defective the cost of all remedial measures shall be borne by the Contractor, including the cost of re-testing. The contractor is responsible for the good quality of all welding work and no exceptions the be made on the grounds that the Architect or his representative have inspected any part or parts of work at some stage during production.

N.19 Fabrication

As much of the work of fabrication of the steelwork as is reasonable practicable shall be completed in the manufacturer's works. Field connection shall be made in accordance with the approved drawings. The Contractor shall give four days clear notice of steelwork ready for inspection at the manufacturer's works, to facilitate inspection before delivery.

N.20 Cost of temporary erection, etc

Trial erection of principal or other units may be called for at the discretion of the Architect or his representative.

The cost of any necessary temporary erection, testing, packing, marking, carriage and delivery, is deemed to be included by the Contractor in the tender price.

N.21 Joints and connection

No variation of the number, type or position of the joints or connections shown on the drawings shall be made without the consent of the Architect. If such consent is desired the Contractor shall submit detailed drawings of the proposed joints for the approval of the Architect and no extra cost incurred by reason of such additions or alterations will be allowed to the Contractor.

Specification
Structural Steelwork

(2/N/4)

N.22 Painting at works

Where described as primed at works, steelwork shall be freed of rust, mill scale, welding slag and flux residue and shall be dry immediately prior to painting with primer.

For joints with high strength friction grip bolts the contact surface shall be left unpainted but special care shall be taken after assembly to paint all edges and corners near the joints together with bolt heads, nuts and washers to prevent the ingress of moisture. For joints made with other bolts the contact surfaces shall each be given a coat of priming paint and for shop connections the contact surfaces shall be brought together while the paint is still wet.

For welded connections where the contact surfaces are not completely sealed the contact surfaces shall be painted to within 50 mm of the edges that are to be welded.

The primer shall be touched up with similar primer if damaged by subsequent handling.

Specification
Structural Steelwork

(2/N/5)
METALWORK

LIST OF CLAUSES

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P.1 Backgrounds

P.2 Preparation for welding

P.3 Fixing by bolting, etc.

DEFINITIONS

P.4 Holes for attachments

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P.12 Steel for general metalwork

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WORKMANSHIP

P.18 Smithing, etc,

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(2/P/1)

P.23 Fabrication

P.24 Joints and connections

P.25 Painting at works

P.26 Welded members to be Galvanized

P.27 Metalwork to be painted

P.28 Fixing windows

P.29 Method of measurement

Specification

Metalwork

(2/P/2)

METALWORK

QUALIFICATION OF THE RULES OF THE SMM

P.1 Backgrounds

Notwithstanding the provisions SMM Clause P.1 (a) (iii) the background or support to which metalwork is fixed shall be deemed to be any background compatible with the method of fixing given in the descriptions.

P.2 Preparation for welding

Notwithstanding the provisions of SMM Clause P.1 (d) (iii), description of work required to be welded and ground to smooth finish shall be deemed to include the preparation of the members.

P.3 Fixing by bolting, etc.

Notwithstanding the provisions of S.M.M. Clause A.3 (b) (iii), the term 'fixing by' used in conjunction with any method of fixing shall not be deemed to include any fixing materials but shall be interpreted as a definition of fixing method only.

DEFINITIONS

P.4 Holes for attachments

Where lugs or other subsidiary members are given in the description of main members of plates, bars, holes required for the screws, bolts or rivets by which the subsidiary members are attached to the main members shall be deemed to be included.

P.5 Welding

In the absence of specific requirements the techniques and materials employed in welding shall be selected with due regard to the character of the work and the metals being connected.

GENERALLY

P.6 Shop drawings

The Contractor shall submit complete shop drawings as and when required by the Architect for his approval.

P.7 Standard of construction for structural work

Structural metalwork and testing shall comply with the relevant clauses of B.S. 449.

P.8 Fabrication of structural metalwork

Structural metalwork shall be fabricated by a specialist firms and, before an order is placed by the Contractor such specialist firm shall be approved in writing by the Architect.

P.9 Shop details for structural work

The Contractor shall include for the preparation of all shop details for structural work from the drawings supplied by the Architect. All such details shall be approved in writing, by the Architect before the work is put in hand. Every drawing shall show the number and sizes of all rivets and bolts, complete details of welds, type of electrodes, welding procedure, whether the welds are to be made in the shop or elsewhere and other relevant information.

Specification Metalwork

(2/P/3)

P.10 Accuracy of drawings

The Contractor shall be responsible for the correctness of his shop details and for shop fittings and site connections

P.11 Dimensions to be verified

The Contractor shall take the dimensions from the site or buildings and he shall verify all dimensions given on the drawings before the work is put in hand.

MATERIALS

P.12 Steel for general metalwork

Mild steel shall comply with B.S. 4360 Grade 43A. Hot rolled sections shall comply with B.S. 4, Part 1. Hot rolled hollow shall comply with B.S. 4, Part 2. Tubes (other than circular hot rolled hollow sections) shall comply with B.S. 1775 and shall be of the type of steel and method of manufacture described.

P.13 Steel for structural metalwork

- (i) All structural and rivet mild steel shall comply with B.S. 449 and B.S. 4360: Part 2.,
- (ii) All structural steel tubes shall comply with B.S. 6323 and B.S. 449 Part 2.
- (iii) Mild steel and medium tensile steel electrodes for metal-arc welding shall comply with the requirements of B.S. 639
- (iv) All mild steel bolts and nuts shall have a tensile strength of not less than 432 N/per sq.m 28 tones per sq in) and a minimum elongation of 17 per cent as defined in Clause 2 of B.S. 916.
- (v) All high tensile steel bolts, nuts and washers shall have a minimum tensile strength of 570 N/per sq.m (37 tons per sq in).
- (vi) High strength friction grip bolts and washers shall comply with B.S. 4395 Part 1.
- (vii) All plain washers shall be of steel. Tapered or other specially shaped washers shall be made of steel or malleable cast iron complying with B.S. 3410.

P.14 Cast iron

Cast iron shall comply with B.S. 1452

P.15 Galvanized work

Iron and steel, where Galvanized, shall comply B.S. 729 entirely coated with zinc after fabrication by complete immersion in a zinc bath in one operation and all excess carefully removed. The finished surfaces shall be clean and uniform.

Zinc sprayed iron and steel shall comply with B.S. 2569. The nominal thickness of zinc coating shall be not less than 0.102 mm and at no point less than 0.070 mm.

P.16 Bolts and nuts

Bolts and nuts shall comply with B.S. 1494 and 4190 and have Whitworth threads.

Specification

Metalwork

(2/P/4)

P.17 Aluminium

Wrought aluminium shall be of the alloys described and shall comply with the following:-

Plate, sheet and strip	- B.S. 1470
Drawn tube	- B.S. 1471
Extruded round tube and	
Hollow sections, bars and rods	- B.S. 1474

WORKMANSHIP

P.18 Smithing, etc

All smithing and bending shall be soundly and neatly executed, care being taken not to overheat.

P.19 Forging

All straps, bolts and similar work shall be forged neat and clean from the anvil.

P.29 Welding

The work 'welded' is to be understood to include the normal trade methods of jointing metals using an oxyacetylene torch, rod and flux. The joints shall be made so that they will transmit the loads and resist the stresses to which they will be subjected. All excess metal is to be filed down and smoothed off to a workmanlike finish to the approval of the Architect. The materials employed in welding shall be selected with due regard to the character of the work and the metals being connected.

P.21 Structural work generally

The whole of the fabrication and erection of the structural metalwork shall be carried out in accordance with B.S. 4360 Part 2. The welding of steel to B.S. 4360 must conform to :-

B.S. 1140 - “Resistance spot welding of uncoated and coated low carbon steel”

Or

B.S. 5135 - “metal arc welding of carbon and carbon manganese steels” as applicable.

For welding any particular type of joints the Contractor shall provide evidence acceptable to the Architect that the welder has satisfactorily completed the appropriate tests as described in B.S. 449, Part 2, Chapter 6. Any welder’s tests shall be made at the Contractor’s expenses and shall include the cost of any fees incurred by the Employer for witnessing of, or making such tests.

P.22 Rejection

Any portion of the work which, in the opinion of the Architect is not in accordance with the drawings or specification shall be rejected whether before or after delivery and must be removed from the site if delivered, within 24 hours from receipt of such notice of rejection at the Contractor’s expense. Any delay caused by such rejection will not in any way relieve the Contractor from his responsibility with regard to the provisions of the Contract.

Specification
Metalwork

(2/P/5)

P.23 Fabrication

As much of the work of fabrication of the structural metalwork as is reasonably practicable shall be completed in the manufacturer’s works. Field connections shall be made in accordance with the approved drawings. The Contractor shall give four days’ clear notice of structural metalwork ready for inspection at the manufacturer’s works, to facilitate inspection before delivery.

P.24 Joints and connections

No variation of the number, type or position of the joints or connections shown on the drawings of structural metalwork shall be made without the consent of Architect. If such consent is desired the Contractor shall Submit detailed drawings of the proposed joints for the approved of the Architect and no extra cost incurred by reason of such additions or alterations will be allowed to the Contractor.

F.25 Painting at works

Where described as primed at works, structural metalwork shall be freed of rust, millscale, welding slag and flux residue and shall be dry immediately prior to painting with primer.

For joints with high strength friction grip bolts the contact surface shall be left unpainted but special care shall be taken after assembly to paint all edges and corners near the joints together with bolt heads, nuts and washers to prevent the ingress of moisture. For joints made with other bolts and rivets the contact surfaces shall each be given a coat of priming paint and for shop connections the contact surfaces shall be brought together while the paint is still wet.

For welded connection where the contact surfaces are not completely sealed the contact surfaces shall be painted to within 50 mm of the edges that are to be welded. The primer shall be touched up with similar primer if damaged by subsequent handling.

P.26 Welded members to be Galvanized

All welded members which are to be Galvanized shall be Galvanized only after all fabrication and welding is complete.

P.27 Metalwork to be painted

All metalwork which is to be painted shall be with one coat of primer before fixing.

P.28 Fixing windows

Windows shall be fixed entirely in accordance with the manufacturers instructions. They shall be properly stored at the site off the ground under weatherproof cover.

P.29 Method of measurement

Joints in the running length of members of balustrades, etc., required by the fabricator for ease of transporting and fixing, shall be deemed to be included in the prices for such work.

Except where otherwise described, holes, bolts, and cutting and pinning have been measured separately.

Specification
Metalwork

LIST OF CLAUSES

QUALIFICATIONS OF THE RULES OF THE SMM

Q.1 Jointing pipes

Q.2 Provision of holes

DEFINITIONS

Q.3 Painting

Q.4 Welding

Q.5 Backgrounds requiring plugging

Q.6 Plugging

Q.7 Surface finishes

Q.8 Pipe sizes

GENERALLY

Q. 9 Execution of plumbing work

RAINWATER INSTALLATION

Q.10 Plastic pipes and fittings

Q.11 Galvanized steel tubes and fittings

Q.12 Rainwater outlets

Q.13 Testing

SANITARY INSTALLATION

Q.14 Bye-Laws

Q.15 Setting out

Q.16 Spun cast iron pipes, cast iron fittings and accessories

Q.17 Galvanized steel tubes and fittings

Q.18 Plastic pipes and fittings

Q.19 Sleeves

Q.20 Brackets and hangers

Q.21 Wire balloons

Q.22 Appliances

Specification

Plumbing Installation

(2/Q/1)

Q.23 Testing

Q.24 Cleansing

Q.25 Habitation certificate

HOT AND COLD WATER INSTALLATIONS

Q.26 Galvanized steel tubes and fittings

Q.27 Pipework generally

Q.28 Sleeves

Q.29 Pipework ancillaries

Q.30 Tanks and cisterns

Q.31 Testing

Specification

Plumbing Installations

(2/Q/2)

PLUMBING INSTALLATIONS

QUALIFICATIONS OF THE RULES OF THE SMM

Q.1 Jointing pipes

Notwithstanding the provisions of SMM Clause Q.9 (b), the prices for all galvanized steel screwed pipes shall be deemed to include for jointing with hemp and red lead or 'Boss' white unless otherwise described and the prices for all cast iron pipes shall be deemed to include for jointing with a gasket of hemp and cold caulking compound unless otherwise described.

Q.2 Provision of holes

Notwithstanding the provision of SMM Clause Q.1 (g), the provision of holes shall be deemed to be included in the description of fixing.

DEFINITIONS

Q.3 Painting

The preparation of surfaces shall be deemed to be included with the description for painting. Specific requirements relating to the preparation of surfaces are given in the WORKMANSHIP section or these Preambles. In the absence of specific requirement surfaces shall be prepared in the manner recommended by the manufacturer of the paint being used.

Q.4 Welding

In the absence of specific requirements the techniques and material the work and the metals being connected.

Q.5 Backgrounds requiring plugging

The term 'backgrounds requiring plugging' shall mean any or all of the backgrounds described in SMM Clause Q.1 (h)(iv), and shall be deemed to include the associated plugging.

Q.6 Plugging

The term 'plugging' shall mean provision and fixing of hardwood or approved proprietary plugs, or, at the Contractor's option, fixing by means of a cartridge operated rivet gun or other approved mechanical means.

Q.7 Surface finishes

In the absence of specific requirements, the treatment and finish or pipe fittings shall be appropriate to finish of the pipes with which they are associated."

Q.8 Pipes sizes

The sizes of the pipe shall be the diameter of the bore.

GENERALLY

Q.9 Execution of plumbing work

All plumbing work shall be executed in accordance with the best principles of modern practice by a firm of fully qualified and registered plumbers. The

Contractor shall obtain the Architect written approval to the firm he proposed to employ before the plumbing works are commenced. (Cont'd.)

Specification

Plumbing Installation

(2/Q/3)

Q.9 Execution of plumbing work (Cont'd.)

The contractor shall obtain the Architects prior written approval to the position of all pipe runs, valve positions, control points, access points and the for all plumbing installations.

At the time of practical completion the Contractor shall prepare and hand to the Architect four copies of plans and diagrams showing the positions of all pipe runs, valve positions, control points, access points and the like for all plumbing installations. Such plans and diagrams shall be to the Architect approval, and practical completion of the plumbing installation shall be deemed to have taken place only after receipt by the Architect of such approval plans and diagrams.

GENERALLY

All plumbing and drainage works shall be executed in accordance with the Regulations of the Local Authorities and Water Supply Companies The Contractor shall give all notices and pay all fees require thereunder. The amount of such fees shall be deemed to be included in the Contract Sum, unless they are expressly in these documents by way of a Provision Sum or PC Sum.

RAINWATER INSTALLATIONS

Q.10 Plastic Pipes and fittings

Plastic pipes, fittings and accessories shall be obtained from a manufacturing source approved by the Architect in writing to comply with B.S 4576, heavy grade PVC, colour to be selected by the Architect, fixed true to line with straps, supplied by the manufacturer screwed to hardwood plugs with galvanized screws, and jointed all in accordance with the manufacturer's instruction . Rubber sealing rings shall comply with B.S. 2494 type 2.

Q.11 Galvanized steel tubes and fittings

Galvanized steel tubes and fittings shall comply with B.S. 1387 "medium" grade with galvanized reinforced malleable cast iron fittings complying with B.S. 143 and 1256, with B.S. 21 threads.

Jointing - Tubing and fittings shall be seam-jointed using hemp and red lead putty or 'Boss' white.

Fixing - Tubes shall be fixed clear of walls or soffits, with galvanized malleable iron brackets complying with B.S. 1494, (or with hangers or special fixing where so described), spaced at not more than 3 meter centers.

Q.12 Rainwater outlets

PVC rainwater outlets shall be manufactured to the sizes and profiles measured herein from heavy grade PVC, with a minimum 75 mm wide flange all round the top for roof surfaces; fully bedded in hot bitumen and jointed to the PVC rainwater pipes.

Fulbora type coated cast iron outlets, with grating, hook bolt and clamping device shall be cast into concrete or built into blockwork in the positions and to the elevations shown on the drawings, and jointed with caulked lead to rainwater pipes.

Q.13 Testing

Rainwater installations shall be subjected to a water test and proved capable of withstanding a pressure of 1.05 m head of water to the satisfaction of the Architect. Any defects are to be made good by the Contractor and the whole system left sound and perfect.

Specification

Plumbing Installations

(2/Q/4)

SANITARY INSTALLATION

Q.14 Bye-Laws

All the work shall comply with the requirements of the Local Council Bye-Laws and drainage regulations, and shall be executed to the satisfaction of the Architect and the Local Authority.

Q.15 Setting-out

The position of all pipe runs, including joints and connections, holes and the like, shall be agreed with the Architect before work is commenced.

Q.16 Spun cast iron pipes, cast iron fittings and accessories

Spun cast iron pipes and sand cast iron fittings shall comply with B.S 416 for medium grade coated pipes and fittings. Sockets and spigots shall be type B on pipes and type A on fittings.

Access - doors shall be oval type with asbestos washers and manganese bronze bolts.

Jointing - pipes and fittings shall be jointed with a gasket of hemp and tightly caulked cold caulking compound.

Fixing - except where adequately restrained and supported by being built in, all pipes and fittings shall be fixed with one holderbat to each socket. Pipes less than 75 mm diameter shall be fixed 25 mm clear of walls and those 75 mm diameter and Over, 40 mm clear of walls. Holderbats shall comply with B.S. 416 Table 21

Q.17 Galvanized steel tubes and fittings

Galvanized steel tubing shall comply with B.S. 1387 "medium" grade with galvanized reinforced malleable cast iron fittings complying with B.S. 143 and 1256, with B.S 1256 threads.

Jointing - tubing and fittings shall be seam-jointed using hemp and red lead putty or 'Boss' white.

Fixing - tubes shall be fixed clear of walls or soffits, with galvanized malleable iron brackets complying with B.S. 1494 Table 6a (or with hangers or special fixing where so described), spaced at not more than 3 metre centers.

Q.18 Plastic pipes and fittings

Soil, waste and ventilating pipes, fittings and accessories shall be obtained from manufacturing source approved by the Architect in writing to comply with B.S. 4514 in manufacturer screwed to hardwood plugs with galvanized screws and jointed in accordance with the manufacturer's instructions.

Waste and ant-syphonage pipes below 54 mm in diameter shall comply with B.S. 5255.

Q.19 Sleeves

All drains passing through walls or foundations shall have sleeves of cast iron pipe of sufficient size to allow a 3 mm clearance round the drain.

Q.20 Brackets and hangers

Brackets for supporting horizontal drains from walls or beams, shall be of 75 mm x 75 mm x 10 mm coated steel tee with one end rounded up and of sufficient for the other end to be built in for a depth of 225 mm. (contd)

Specification

Plumbing installations

(2/Q/5)

Q.20 Brackets and hangers (cont'd.)

Hangers for suspending drains from soffits shall consist of a pair of forged 50 mm x 10 mm coated steel half pipe saddles bolted together around the pipe and to a 20 mm diameter coated steel for the required length with one end forged into an eye to receive the bolt. The top of the bar shall either be fanged casting in, or shall be threaded with nut and plate washer. Where fixed through floors the projecting end of the bar shall be cut off flush with the nut.

Q.21 Wire balloons

Wire balloons shall be of copper; mosquito proofed and shall comply with B.S. 416 Table 22.

Q.22 Appliances

Appliances shall be ROCA Products. In the event that the appliances specified are unavailable, the supply of alternatives which are at least equal in every respect in quality and specification to those specified will be permitted with the prior written approval of the Architect.

The Contractor shall order the appliances immediately on commencing of the works, with a copy of the order being provided to the Architect.

Q.23 Testing

The contractor shall, from time to time as required to suit the progress of the building, air-test the plumbing and internal drainage in sections, to the satisfaction of the Architect, before any such work is covered. At the completion of the works all soil pipes and branches and waste pipes and other parts of the internal drainage works connected directly with any sewerage drain or sewerage drain ventilating pipe or soil pipes, shall be subjected to a water test and be proved capable of resisting a pressure of 1.5 meter head of water and the Architect may also direct that a sample or ventilating system as he thinks desirable, and everything necessary for these shall be supplied by the Contractor.

Q.24 Cleansing

On completion of the works, immediately before handing over, the Contractor shall cleanse thoroughly the whole of the system and prove that is functioning freely to the satisfaction of the Architect .

Q.25 Habitation certificate

On completion, the Contractor shall obtain a 'Habitation' certificate from the Local Council and forward it to the Architect.

HOT AND COLD WATER INSTALLATIONS

Q.26 Galvanized steel tubes and fittings

Galvanized steel tubes shall comply with B.S. 1387 heavy grade for rising mains and branches off rising mains, and medium grade for distributing pipes; except where the latter are in contact with the ground when they shall be heavy grade. Fittings shall be galvanized reinforced malleable cast iron fittings complying with B.S. 143 and 1256, with B.S. 1256 threads.

Jointing - tubes and fittings shall be screw-jointed using hemp and red lead putty or 'Boss' white. Connections to flushing cisterns, bit taps and the like shall be made with copper connectors to facilitate removal.

Fixing - unless described as being fixed in chases, tubes shall be fixed clear of walls and soffits with galvanized malleable iron brackets complying with B.S. 1494, Table 6a (or with hanger or special fixing where so described), spaced at not more than the distance in the following tables:- (Cont'd.)

Specification

Plumbing Installations

(2/Q/6)

Q.26 Galvanized steel tubes and fittings (Cont'd.)

Spacing of fixing

<u>Size of pipe</u>	<u>Maximum spacing in meter</u>
13 mm	2.00
19 mm	2.50
25 mm to 50 mm	3.00
over to 50 mm	3.50

Q.27 Pipe work generally

Pipes shall be the maximum lengths possible to avoid unnecessary jointing. Pipes shall be fixed to sufficient falls to prevent air locks and to enable the system to be drained.

Q.28 Sleeves

Where sleeves are required for pipes passing through concrete, or block work, they shall be of galvanized steel tube of sufficient diameter to give at least 3 mm clearance around the pipe.

Q.29 Pipe work ancillaries

Drainage taps with loose keys shall comply with B.S. 2879.

Ball valves shall be 'Portsmouth' type complying with B.S 1212 for high or low pressure as described fitted with a silence tube drilled with a 6 mm hole above the level of the overflow warning pipe. Floats not exceeding 150 mm diameter shall be plastic type complying with B.S 1968 Clause.

Bib-taps shall comply with B.S. 1010 and shall be of brass with fixed jumpers and where so described shall be chromium plated or shall have nozzle screwed for hose union and locking arm.

Stop valves shall comply with B.S 1010 and shall be of brass with crutch handles or loose key where as described. Those in exposed positions shall have polished brass bodies.

Gate, check and globe valves shall comply with B.S 5154 and shall be of plate of approved manufacture complete with cover with inspection manhole. Tanks shall be assembled entirely in accordance with the manufacturer's written instructions.

Storage cisterns shall comply with B.S 417, Part 2, Grade A, galvanized with one piece galvanized covers.

Q.31 Testing

Clean out storage cisterns and tanks, including removal of all swarf, fill and test the whole of the hot and cold water installations, rectify all defects, drain and leave in a clean, serviceable condition.

Specification Plumbing Installation

(2/Q/7) ELECTRICAL INSTALLATIONS

LIST OF CLAUSES

GENERALLY

- R.1 Bye – laws
- R.2 Inspection of the site of the works
- R.3 Definitions
- R.4 Earthing
- R.5 Installatio

MATERIALS

- R.6 Materials and equipment
- R.7 Conduit and fittings
- R.8 Trunking and fittings
- R.9 Wires and cables
- R.10 Handling
- R.11 Clearance to other equipment
- R.12 Distribution panel boards
- R.13 Junction and outlet boxes
- R.14 Switches and sockets

WORKMANSHIP

- R.15 Conduit and fittings
- R.16 Trucking and fittings
- R.17 Wires and cables
- R.18 Outlet and junction boxes
- R.19 Switches and convenience outlets
- R.20 Panel boards
- R.21 Lighting fittings
- R.22 Telephone system
- R.23 Tests
- R.24 Completion and record drawings

Specification Electrical Installation

(2/R/1)

GENERALLY

R.1 Bye – laws

The entire installations are to be carried out in accordance with the latest edition of “Regulations for the Electrical Equipment of Buildings published by the Institution of Electrical Engineers (I.E.E.), London and TANESCO special regulations.

The entire installations shall conform in every respect with the regulations and requirements of TANESCO, as applied to the present electrical installation and of the P. & T. and all other Public Authorities having jurisdiction in respect of these installations.

R.2 Inspection of the site of the works

The Contractor shall be deemed to have inspected the site of the works to completely ascertain the nature of, and the particular conditions under which, the Electrical Works shall be carried out and shall be further deemed to have obtained all other information required for the proper carrying out of the said works to the approval of TANESCO.

R.3 Definitions

Definitions of terms used herein: “Work”: labour, materials, equipment, controls, accessories and all other items customarily furnished and/or required for proper and complete installation and testing of work.

“Wiring”: conduit, fittings, wire, junctions, connections, pull and outlet boxes, switches, motor starters, cut-outs and sockets and all items necessary or required in connection with, or relating to, such wiring. “Concealed”: embedded or closed masonry, concrete or other construction as approved.

“Exposed”: not installed underground or “concealed”.

“Noted”: as indicated on drawings and/or specified.

“Indicated” or “Shown”: as revealed on the drawings

“Similar” or “Equal”: equal in kind, quality and function and of approved manufacturer.

R.4 Earthing

Provide earthing for the entire electrical installation as indicated on the drawings and specified herein.

Include, but not necessarily limited to, requiring earthing are the followings:

- (i) Conductor enclosures

(ii) Panel boards

(iii) Non-current-carrying metal parts of fixed equipments such as motor starters and instrument cases,

(iv) Water piping.

Install earthing conductor and earthing electrodes of approved type, size, number, depth and location so that resistance to ground shall not exceed two (2) Ohms.

Size and type of earthing conductors, earthing wires (in the plastic conducts), earthing clamps, bonding jumpers, conduit, fittings as well as methods of fixing same to obtain electrical continuity and effective earthing shall be as per section 4 of "Regulation for the Electrical Equipment of Building" of the I.E.E.
(Contd)

Specification

Electrical Installation

(2/R/3)

R.4 Earthing (Contd)

The earthing system shall conform in all respect to sections 4 and 5 of "Regulations for the Electrical Equipment of Buildings" of the I.E.E.

R.5 Installation

The contractor is responsible for marking out the cable route and for the supervision of the backfilling in so far as the prevention of damage to cables in this process is concerned.

MATERIALS

R.6 Materials and equipment

Materials: new, best quality and free from defects where procured by the Contractor as the case may be.

Standard: B.S. 1557 - P.V.C. insulated and P.V.C. sheathed cable

B.S. 31 - Steel conduit and fittings (where conduit is exposed only)

B.S. 731 - Flexible steel conduits and adapters.

R.7 Conduit and fittings

Concealed conduit shall be semi rigid heavy duty P.V.C

Outlet boxes shall be galvanized steel

Where outlet boxes do not have an integral cover, install blank cover plates on all outlet boxes installed for future outlets.

Where conduit is installed exposed such conduit and fittings shall be in galvanized steel.

P.V.C. conduit and fittings shall comply with the regulations for no-metallic conduit of "Regulations for Electrical Equipment of Buildings" of the I.E.E.

R.8 Trunking and fittings

P.V.C. trunking shall be grey in colour and before ordering the Contractor shall submit proposal for approval to the Architect and Consulting Engineers.

Cover sections for outlets shall be pre-fabricated bends; angles and end- pieces will be accepted.

Open cable trays shall be straight flange design of heavy duty design. It shall be manufactured by hot dipped galvanized perforated steel, to B.S. 2989-1982. Only pre-fabricated bends tee and cross will be accepted.

Suspension rods shall be minimum 8 mm diameter hot dipped galvanized steel.

R.9 Wires and cables

Insulated conductors for interior wiring shall conform to the latest applicable British Standards and as manufactured by members of Cable Makers Association. (Cont'd.)

Specification

Electrical Installations

(2/R/4)

R.9 Wires and cables (Cont'd.)

Conductor for wiring throughout the building shall be copper single core, P.V.C. (polyvinyl chloride) insulated, 660 v grades, conduit type, in form of single core or multicore as shown on drawings.

Earthing conductors shall be insulated copper, standard soft annealed.

Main feeder cables shall be Cooper PVC SWA PVC 600 v grade.

Cable lugs: Solder less pressure, single or multiple conductor straight or angle type, as required.

Feeder cables and conductors shall have size not less than 2.5 sq.m for circuits 35 m. Or less and not less than 4.00 sq.m for circuits more than 35 m. Long, or where specially indicated that Long, or where specially indicated.

R.10 Handling

Cables shall at all times be handled with care and every effort made to avoid damage.

Unloading, rolling to position and mounting of cable drums shall be carried out efficiently and carefully in the recognized manner and cable shall be pulled from the top of drum and twisting shall at all times be avoided.

Adequate provision of drum jacks, rollers and other handling accessories shall be used and make-shift arrangements will not be tolerated. In all cases care shall be taken to break the rotation of the drum and cable shall not be dragged over loose earth, concrete or any surface but shall be adequately supported on rollers or man-handled into position.

The contractor shall take particular care to avoid damage to other services which may run adjacent to or across the route of the cable being installed.

R.11 Clearance to other equipment

Cables shall be installed within a minimum of 200 mm clearance of any equipment or pipe work including lagging associated with other services. Where this condition is unavoidable or difficult to maintain, the engineers shall be informed prior to the installation being commenced, otherwise the Contractor may be called upon to divert or adjust the route of any cable so affected.

Cables in trenches are to be laid at a minimum depth of 0.6 m for main cables and 0.75 m for 11 KV cables and are to be on a 100 mm be of sifted soil or sand and a further 100 mm shall be added before laying cable covers in position. The sand bedding and covering will be carried out by the Contractor.

When laid in trenches the cables are to be completely protected by interlocking concrete or other approved cable covers.

R.12 Distributions panel boards

Automatic circuit breaker panel boards, complete with their enclosing cabinets shall be installed conforming to detailed specifications as hereinafter listed.

The enclosing cabinet shall be manufactured from code gauge, galvanized sheet steel, with corners lapped and riveted, or fastened by other approved standard methods. Trims and doors shall be manufactured from one piece of

full finished sheet steel not less than 12 s.w.g. not galvanized. Panel boards shall be surface- mounted or recess- mounted as indicated on the drawings.

Directory card with frame and transparent cover on each panel board to indicate designation or the circuits. (Cont'd.)

Specification
Electrical Installations

(2/R/5)

R.12 Distributions panel board (Cont'd.)

Panel boards shall be of manufacturer's standard design for operation on 400/230V, 3 phase, 4 wire solid neutral system.

All automatic circuits breakers shall be quick make, quick break on manual operation, trip free, with inverse time characteristics secured through the use of a bimetallic tripping element supplemented by a magnetic trip . Automatic tripping shall be clearly shown by the operating handle assuming a neutral position midway between the manual "on" and "off" position.

All multi-pole breakers shall be so designed that an overload on one pole automatically causes all poses to open.

R.13 Junction and outlet boxes

Junction and outlet boxes for concealed work shall be galvanized stamped steel or approved plastic type.

All junction boxes shall be of suitable size to avoid undue packing of cable

Outlet boxes shall be of size and type to accommodate structural conditions, size and number of conductors entering the device or fixture for which required.

Covers when required shall be screwed on.

R.14 Switches and sockets

All local wall light switches shall be 10 amps. 250 V, flush single pole, three-way or four-way as required.

All socket outlets shall be 13A, 250 V, flush type, 3 pin (2 pole and earth), unless otherwise noted.

WORKMANSHIP

R.15 Conduit and fittings

Install conduit concealed in walls, floors or ceiling slabs as shown on drawings and herein specified. Conduits of maximum 19 mm diameter may be installed in the concrete topping of the structural roof slab system. Conduit shall not be installed in the roof insulation fill.

Use flexible steel conduit for connection to electric water heater, for short connections where rigid conduit is impractical and where indicated on drawings.

In walls install conduit as nearly as possible vertically or horizontally where necessary, but never diagonally. In concrete slab conduit shall be approved as to locations, proper bends, even pitch and rigidity of support before slab is poured.

Place caps in ends of conduit as soon as located to prevent entry of foreign materials.

Conduit shall be continuous from outlet to outlet, from outlets to cabinets, junctions or pull boxes, and secured to all boxes so that each system is continuous from service to outlets.

Slope conduits continuously toward outlet boxes to drain properly and avoid trapping condensate.

Specification

Electrical Installation

(2/R/6)

R.19 Switches and socket outlets

Fasten switches and socket outlets to boxes firmly so that they do not depend on cover plates to pull them tight.

Light switches to be located near the door on side opposite hinge except where otherwise indicated. Wherever possible to be grouped in a gang cover plate. Verify final door hinge location in field prior to switch boxes installation.

Socket outlet circuits shall be independent of light circuits.

Mounting height: Unless otherwise noted on the drawings electric devices shall be located with their center line at the following elevations above finished floor:

Light switches	1.20 m
Socket outlets	0.45 m
Water heater switch	1.80 m
Lighting fixtures	as shown on drawings
Wall brackets	2.10 m

R.20 Panel boards

Install where shown on drawings automatic circuit breaker panel boards complete with their enclosing cabinet.

All cabinets shall be painted with one primer coat and at least one finish coat.

All panel boards shall be earthed.

R.21 Lighting fittings

Install lighting fittings complete with lamps as scheduled on drawings. The contractor shall be responsible for all fitting wiring, hanging, connecting up and making ready to operate.

The lighting fittings as shown on schedule are listed by manufacturer's catalogue not for the purpose of indicating by general type, style and quality required. Similar from other manufactures may be provided by the Client.

Where manufacturer's catalogue numbers are not noted the Contractor shall propose lighting fitting, of design shown, for the Client's procurement.

Fluorescent type fixtures shall be provided with single or double lamp ballasts of the high power factor type and low level sound.

Incandescent light fixtures shall be equipped with English bayonet lamp holders, heavy duty type.

Flexi glass and similar plastic diffusing material shall be guaranteed against cracking, marring and discoloration for five years.

R.22 Telephone system

Install required network of empty conduit, terminating in the telephone outlet box as shown on the drawings.

Contractor shall be responsible for coordinating this installation with the TTCL.

Specification

Electrical Installations

(2/R/7)

R.23 Tests

Upon completion of works, test installation for verification of polarity, insulation and earthing. Test all panel feeders and electrical wiring. If tests indicate faults, these shall be rectified and further tests shall be conducted as required by TANESCO and/or the Architect.

R.24 Completion and record drawings

The Contractor shall arrange for a full set of prints to be kept on the site, showing the progress of all work in connection with the electrical and telephone installations. Such plans must be kept up to date and all tube runs, positions of points, equipment and apparatus etc., are to be coloured in red on the drawings as they are installed.

Upon Practical completion of the Work the Contractor shall provide transparent linen negatives and two black and white prints on opaque linen from each negative of the following record drawings:

- 1 1:100 scale plans showing exact location and sizes of all conduit runs, circuit wiring, sub-main wiring, panel boards, position of equipments, controlling switches, telephone outlet boxes, receptacles, power outlets, lighting points etc.

Specification

Electrical Installation

(2/R/8)

FLOOR, WALL & CEILING FINISHING

LIST OF CLAUSES

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- S.1 Generally
- S.2 Cement
- S.3 Lime putty
- S.4 Sands
- S.5 Water
- S.6 Storage of materials
- S.7 Testing
- S.8 Preparation of surfaces
- S.9 Dubbing out
- S.10 Mixing of materials
- S.11 Period between coats

S.12 Finish

S.13 Junctions of wall and ceiling

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BEDS AND BACKINGS

S.15 Materials, storage, testing and mixing of materials

S.16 Light weight roof screed

S.17 Cement and sand proportions

S.18 Preparation of surfaces

S.19 Laying

S.20 Surfaces of beds and backings

OTHER INSITU FINISHING

S.21 Materials, storage, testing and fixing of materials

S.22 Water proofers

S.23 Integral hardeners

Specification

Floor, Wall & Ceiling finishing's

(2/S/1)

S.24 Preparation of surfaces

S.25 Cement and sand paving

S.26 Granolithic paving

S.27 Insitu terrazzo paving

S.28 Washed terrazzo wall finish

S.29 Tyrolean finish

TILE, SLAB AND BLOCK FINISHINGS

S.30 Mortar for bedding and pointing

S.31 Preparation of surfaces

-
- S.32 Glazed ceramic wall tiles
- S.33 Concrete tiles
- S.34 Terrazzo tiles
- S.35 Vinyl and vinyl asbestos tiles
- S.36 Wood block flooring

PLAIN SHEET FINISHINGS

- S.37 Generally
- S.38 Method of measurement

Specification

Floor, Wall & Ceiling Finishing

(2/S/2)

FLOOR, WALL & CEILING FINISHINGS

PLASTERWORK

S.1 Generally

Render, both internal and external shall be cement and sand in the proportions 1:4 finished to thickness specified.

Plaster shall consist of an undercoat of 1 part cement to 4 parts sand by volume and 5% lime putty, and a finishing coat of 1 part cement to 1 part sand to 5 parts lime putty. Each coat shall be finished to the thickness specified.

S.2 Cement

Cement shall be ordinary Portland cement and shall comply with B.S 12. White and coloured cements shall comply with B.S 12 and be obtained from an approved manufacturer.

S.3 Lime putty

Lime putty shall be prepared from hydrated lime complying with B.S 890.

Hydrated lime shall be added to water, stirred to a creamy consistency and left to mature for at least 16 hours before use.

Alternatively, ready slaked lime may be obtained from an approved source.

The lime putty shall be protected from drying out.

S.5 Sands

Sand for cement and lime mixes shall comply with B.S 1199. Table I.

Sand for use with white Portland cement shall be silver sand and that for use in coloured cement mixes shall be of a suitable colour.

S.6 Storage of materials

All plasters, lime and cement, shall be stored in a properly roofed, weatherproof, dry, well ventilated shed, use exclusively for this purpose, with a wood floor not less than 150 mm clear above the ground. All sands shall be stored separately, according to type, on clear, hard, dry standing and shall be protected from contamination.

S.7 Testing

Samples of all materials, as directed, shall be taken from time to time as required by the Architect.

All defective materials shall be removed from the site without delay, at the Contractor's expense.

Specification

Floor, Wall & Ceiling Finishing

(2/S/3)

S.8 Preparation of surfaces

Surfaces to receive plastering shall be dry brushed to remove all loose particles, dust, laitance, efflorescence, etc., and any projecting fins on concrete surfaces shall be hacked off. All trace of mould oil shall be removing from concrete surface by scrubbing with water containing detergent and rinsing with fresh water.

Concrete surfaces shall be hacked over to provide adequate key.

Surfaces shall be wetted and re-wetted as required to equalize suction before the plaster coats are applied. In particular, dense hard concrete surfaces shall be wetted and re-wetted as required before bonding plaster is applied.

S.9 Dubbing out

Dubbing out shall be in the same mix as subsequent coats and shall not exceed 10 mm in thickness in one particular applications

S.10 Mixing of materials

All materials shall be thoroughly mixed in the proportions described. No mixes of plasters, other than those described, shall be used.

Bunkers and gauge boxes shall be thoroughly cleaned after each mix and due care and attention shall be given at all times to their cleanliness.

Cement – lime – sand plasters shall be used within two hours of the gauging with cement.

All tools shall be kept clean and fresh plaster shall not be contaminated with set plaster.

S.11 Period between coats

Cement – lime – sand undercoats shall be allowed to dry out thoroughly before a further coat is applied.

S.12 Finish

All undercoats shall be scratched to provide an adequate key for the next coat. Unless otherwise described, all rendering shall be finished with a wood float, as shall all undercoats. All finishing coats shall be finished with a steel trowel.

S.13 Junction of wall and ceiling

A neat definite cut shall be made with the edge of the trowel through all coats of the wall plaster at the junctions with ceilings.

S.14 Arrises

All arrises shall be pencil rounded unless otherwise, specified.

BEDS AND BACKIGNS

S.15 Materials, storage, testing and mixing of materials

Cement, sand, water, etc., storage, testing and mixing of materials shall be as described for plasterwork.

Specification

Floor, Wall & Ceiling Finishing

(2/S/4)

S.16 Light weight roof screed

Light weight roof screed shall consist of one part cement to eight parts vermiculite aggregate, laid to falls as necessary and shall be covered with a

minimum of 12 mm cement and sand (1:4) screed finished to suit the requirements of the particular finishing.

All junctions between horizontal and vertical surfaces to roofs shall be finished with a triangular angle fillet of the sizes described.

Light weight roof screen shall be cured properly for 7 days, and shall be thoroughly and completely dry before any finishing are applied.

S.17 Cement and sand proportions

Cement and sand shall be in the proportions of 1:3 or 1:4, as specified by volume.

S.18 Preparation of surfaces

Walls shall be prepared as described for 'Plasterwork' concrete floors or roofs to receive screeds or paving shall be hacked where necessary to remove concrete mortar or plaster droppings and to expose the coarse aggregate and well brushed to remove all loose particles and dirt.

Concrete floors and roofs shall be wetted before screeds or paving are laid, with a cement sand slurry (1:1) being scrubbed into the surface in front of the screed or paving laying.

S.19 Laying

Beds and backings shall be laid in bays of suitable lengths and widths and to falls where so shown with proper screeds and shall be kept wet and protected until set hard.

S.20 Surface of beds and backings

Screeded beds for insitu floor finishings or floor finishings bedded in mortar shall be left rough from the screeding boards.

Floated beds for inflexible floor finishings bedded in mastic, shall be left with a plain un-textured surface.

Trowelled backings for finishing by specialists shall be to the approval of the specialist Sub-Contractor

OTHER INSITU FINISHING

S.21 Materials, storage, testing and mixing of materials

Cement, sand, water, etc., storage, testing and mixing of materials, shall be as described for 'Plasterwork'.

S.22 Water roofers

Water roofers shall be 'Sealocrete' double strength premix, or other approved integral waterproofed, used in accordance with the manufacturers' instructions.

S.23 Integral hardeners

Integral hardener shall be 'Febspeed Plus' or other approved, used in accordance with the manufacturers' instructions.

Specification

Floor, Wall & Ceiling Finishing

(2/S/5)

S.24 Preparation of surfaces

Concrete surfaces to receive paving without screeds, shall be prepared as described herein.

S.25 Cement and sand paving

Cement and paving shall be in the proportions and to the thicknesses described, and shall be finished with a steel trowel unless otherwise specified and shall be protected and kept wet until hard.

S.26 Granolithic paving

Granolithic paving shall consist of 1 volume of cement to 1 volume of sand mixed with 2.5 volumes of approved local stone aggregate laid to the thickness described.

The base shall be kept wet for 12 hours before laying granolithic paving unless the paving is being laid monolithically with the base.

Immediately after laying the granolithic paving shall be protected and kept damp until thoroughly hard. It shall then be ground and polished by machine. Any holes or pores which become apparent after grinding shall be filled with the same mix as the paving, well worked into the surface and left proud. The portions so treated shall be filled with the same mix as the paving, well worked into the surface and left proud. The portions so treated shall be protected and kept damp until hard when they shall be polished.

S.27 In situ terrazzo paving

Terrazzo finish shall be carried out by a firm approved by the Architect in writing. It shall be composed of a screed of cement and sand (1:3) and the terrazzo which shall be a minimum of 16 mm thick. Before terrazzo

work is commenced, the contractor shall submit sample pieces to the Architect for approval.

The terrazzo shall consist of coloured cement and approved local marble aggregate free from dust in the proportions 1:2. The colour of the cement and the grading of the aggregate shall be as selected by the Architect. The terrazzo shall be laid while the underbed is still plastic and be well compacted and trowelled to produce a non absorbent surface. It shall be divided into bays 1 metre by 1 metre with 3mm aluminium strips for the full depth of the terrazzo and underbed. Immediately after laying the terrazzo shall be protected and kept damp until thoroughly hard. It shall then be ground and polished by machine. Any holes or pores which become apparent after grinding shall be filled with neat coloured cement well worked into the surface and left proud. The portions so treated shall be protected and kept damp until hard when they shall be polished. Dry polishing shall only be carried out with the agreement of the contractor.

S.28 Washed terrazzo wall finishing

Washed terrazzo finish shall be carried out by a firm approved by the Architect in writing and shall be guaranteed for six months from the date of completion of the work. It shall be composed of a screeded underbed of cement and sand (1:4), and terrazzo with both layers of the thicknesses specified.

The terrazzo shall consist of cement and local marble aggregate free from dust in the proportions 1:1.5. The colour and grading of the cement and aggregate shall be as selected by the Architect.

The terrazzo shall be laid whilst the underbed is still plastic and shall be compacted and trowelled to produce a non-absorbent surface. Before the final set takes place the terrazzo surface shall be lightly brushed, with just a sufficient amount of water to expose the surface aggregate to produce an even appearance. Adjoining areas and finishing shall be protected from staining, and any stains produced shall be removed or remedied to the satisfaction of the Architect at the Contractor's expense. The whole surface when hard shall be covered with one coat of approved silicone solution.

Specification

Floor, Wall & Ceiling Finishing

(2/S/6)

S.29 Tyrolean finish

Tyrolean finish shall be applied by machine in accordance with the instructions issued by the Cement Marketing Company. The colour of the cement shall be as selected by the Architect. If required to do so by the Architect, the Contractor shall provide a sample panel or panels of Tyrolean finish the cost of which shall be deemed to be included in the Contract Sum. All adjoining areas

and finishing shall be masked and protected so as to prevent staining whilst applying the Tyrolean finish.

TILE, SLAB AND BLOCK FINISHING

S.30 Mortar for bedding and pointing

All materials for mortar, their storage, testing and mixing shall be as described in 'Plasterwork'.

S.31 Preparation of surfaces

All surfaces to receive the finishing in this section shall be thoroughly cleaned; screeds to receive finishing bedded in mortar shall be well wetted before laying is commenced.

S.32 Glazed ceramic wall tiles

Glazed ceramic wall tiles shall comply with B.S. 6431 and shall be of the sizes and colours described, and having cushion edges.

The tiles shall be soaked in clean water for at least half an hour before fixing, stacked on edge tightly together and end tiles turned glaze outwards and fixed as soon as the surface water has gone. The tiles shall be bedded in cement and sand, (1:3), with straight joints 1.5 mm wide pointed in white cement, after scratching the surface of the backing screed to form a key.

Alternatively, tiles shall be wiped clean and fixed dry with 'Richafix', or other approved adhesive, all in accordance with the manufacturers' recommendations with straight joints 1.5 mm wide pointed in white cement.

S.33 Concrete tiles

Concrete tiles shall comply with B.S. 1197, shall be thoroughly soaked in water and allowed to drain before laying and shall be bedded and pointed in cement and sand (1:3), laid true and level or to even falls as specified.

S.34 Terrazzo tiles

Terrazzo tiles shall be laid by a specialist approved by the Architect in writing, and shall be supplied from an approved source. The precast terrazzo shall consist of a backing of Portland cement and washed sand graded from coarse to fine in the proportions of 1:3 and a terrazzo finish not less than 12 mm thick consisting of coloured cement and marble aggregate free from dust in the proportions of 1:2. The colour of the cement and the colour and grading of the aggregate shall be as selected by the Architect.

Tiles shall be hydraulically pressed during manufacturing to produce a non-absorbent surface and shall be polished on the exposed surface.

Tiles shall be thoroughly soaked in water and drained off so that no free water remains on the surface before laying and shall be bedded in cement and sharp sand (1:3) with straight joints 3 mm wide and pointed in coloured cement, to match the colour of the tile, and sand (1:2). The surface of the paving shall finish true and level. All cement stains shall be carefully removed. Sawdust shall not be used as a protection before joints are set.

Specification

Floor, Wall & Ceiling Finishing

(2/S/7)

S.35 Vinyl and vinyl asbestos tiles

Vinyl and vinyl asbestos tiles shall be of the types and sizes described and of a colour to be selected by the Architect. Samples of all tiles and sheet shall be submitted to the architect for his approval. No flooring shall be laid until plastering and painting of walls and ceilings is complete. All vinyl and vinyl asbestos tiles shall be laid by a firm or firms to be approved by the Architect in writing. The Contractor shall obtain from the flooring specialist before laying is commenced, and forward to the Architect, (a) a written statement to the effect that the trowelled bed is in all respects satisfactory to receive the flooring, (b) a guarantee that any defects due to faulty workmanship or materials occurring within six months of the certified date of completion of the whole of the works, will be made good by the specialist at his own expense, and to the satisfaction of the Architect.

S.36 Wood block flooring

Wood block flooring shall be as manufactured by Italwood Ltd., P O Box 2599, Dar es Salaam and shall be of the timber and finish described. The flooring shall be laid by a specialist firm approved by the Architect in writing.

The contractor shall provide the Architect with samples for his approval before any tiles are ordered or laid.

No flooring shall be laid until plastering of walls and ceiling is complete. The contractor shall obtain from the flooring specialist before laying is commenced, and forward to the Architect:-

- (a) a written statement to the effect that the trowelled/floated bed is in all respects satisfactory to receive the flooring and,
- (b) a guarantee that any defects due to faulty workmanship or materials, occurring within six months of the certified date of completion of the whole of the works, will be rectified to the satisfaction of the Architect.

PLAIN SHEET FINISHINGS

S.37 Generally

Plywood, block board, chipboard etc., and their fixing shall be as scribed in Joinery.

S.38 Method of measurement

The work 'wall' in the descriptions of plasterwork shall include walls and partitions of concrete, concrete blockwork, brickwork or clay tile blockwork.

Prices for insitu finishing and beds or backings shall include hacking concrete or raking out brickwork or brickwork joints to form keys.

Prices for all finishing and beds and backings shall include for the following:-

- (1) Working behind pipes, and around flush electrical boxes.
- (2) All dubbing out required on new work to reduce irregularities or cambers,, and to form flat surfaces in the appropriate undercoat.
- (3) Any formwork required.
- (4) Trowel cuts between ceiling and wall plaster.

Specification

Floor, Wall & Ceiling Finishing

(2/S/8)
GLAZING

LIST OF CLAUSES

DEFINITIONS

T.1 Method of glazing

MATERIALS

T.2 Glass generally

T.3 Putty for glazing to wood

T.4 Putty for glazing to metal

T.5 Samples

WORKMANSHIP

T.6 Glass to be kept free from moisture

-
- T.7 Rebates and beads
- T.8 Edges of glass
- T.9 Beads glazing
- T.10 Putty glazing
- T.11 Wired glass
- T.12 Method of measurement

Specification

Glazing

(2/T/1)
GLAZING

DEFINITIONS

T.1 Method of glazing

Notwithstanding references in the descriptions of glazing method to glazing beads, or the like, with associated fixing, and insulating strips, such components will be measured separately in accordance with the appropriate rules of the SMM

The provision of glazing compounds and putties and sprigs, clips and other sundry fixing, shall be deemed to be included with all items of glazing

Distance pieces and setting blocks, in appropriate materials, shall be provided in accordance with good glazing practice and they shall be deemed to be included with all items of glazing.

MATERIALS

T.2 Glass generally

All glass shall comply in all respects with the appropriate section of B.S. 952. Plain sheet clear glass shall be O.Q.; plate glass shall be GG; float glass shall be as manufactured by Pilkington Brothers Limited.

T.3 Putty for glazing to wood

Putty for glazing to wood shall comply with B.S. 544.

T.4 Putty for glazing metal

Putty for glazing metal shall be approved mastic manufactured for that purpose, used in accordance with the manufacturer's instructions.

T.5 Samples

Samples not less than 150 mm square, are to be submitted to the Architect for approval before any glass is cut.

WORKMANSHIP

T.6 Glass to be kept free from moisture

All glass surfaces shall be kept dry during transit and storage. Glass becoming moist from condensation or other causes, shall be thoroughly dried and aired.

T.7 Rebates and beads

All glazing beads in wood shall be primed, (as measured in Painting and Decorating), before glazing is commenced.

T.8 Edges of glass

All glass shall have clean cut edges. The edges of louveres shall be rounded and polished.

T.9 Bead glazing

Glazing fixed by beads shall have both glass and beads bedded and back puttied, and the putty trimmed off flush. Where sealing strip is used, it shall pass round both faces of the glass and be trimmed off flush on both sides. Metal surfaces to receive sealing strip shall be treated with mineral oil before glazing

Specification

Glazing

(2/T/2)

T.10 Putty glazing

Glazing in putty shall be executed in proper bed and back putties, sprigs, clips and splayed and mitred front putties. The back putties shall be trimmed off flush with the top of the rebate and the splayed front putties shall be finished 3 mm back from site line to allow for sealing between glass and putty with paint.

T.11 Wired glass

The wire in wired glass shall extend to the edges and be free from rust etc, and be parallel to the framing.

T.12 Method of measurement

Beads and sealing strips have been measured separately. Prices for glazing with beads are to include for taking out and re-fixing beads as required, which shall be deemed to be bradded unless otherwise described.

Specification

Glazing

(2/T/3)

PAINTING AND DECORATING

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- U.1 Colour range
- U.2 Approval of brands
- U.3 Quality of products
- U.4 Delivery
- U.5 Same makers materials used for coating
- U.6 Information and facilities to supplies
- U.7 Storage
- U.8 Remedying defects due to defective materials
- U.9 Knotting
- U.10 Stopping
- U.11 Linseed oil
- U.12 White spirit
- U.13 Size
- U.14 Cement paint
- U.15 Emulsion paint
- U.16 Black bituminous paint
- U.17 Primer for alkaline surfaces
- U.18 Primer for aluminium

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- U.19 Primer for bituminous surfaces
 - U.20 Primer for iron and steel work
 - U.21 Primer for zinc and galvanized steel
 - U.22 Creosote Type Preservative
 - U.23 Non creosote type preservative
 - U.24 Primer for hardboard
 - U.25 Primer for woodwork

Specification

Painting and Decorating

(2/U/1)

- U.26 Oil paints
- U.27 Polyurethane lacquer
- U.28 Decorative wood stain

PREPARATION OF SURFACES

- U.29 Approval
- U.30 Stopping
- U.31 Plastering, rendering, concrete, blockwork and brickwork
- U.32 Asbestos cement
- U.33 Lead and copper
- U.34 aluminium
- U.35 Iron and steel
- U.36 Zinc and galvanized surfaces
- U.37 Hardboard
- U.38 Fibreboard
- U.39 Plywood

U.40 Woodwork to be painted

U.41 Woodwork to receive clear finish

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U.42 Standard of workmanship

U.43 Stirring of materials

U.44 Manufacturers instructions

U.45 Brush work

U.46 Priming of joinery

U.47 Condition of priming

U.48 Coatings to be dry

U.49 Rubbing down

U.50 Differing colours of undercoats

U.51 Painting in unsuitable conditions

U.52 Protection of wet surfaces

Specification

Painting and Decorating

(2/U/2)

U.53 Damage to adjoining surfaces

U.54 Cleanliness

U. 55 Removal of ironmongery, etc

U.56 Method of measurement

Specification

Painting and Decorating

(2/U/3)

PAINTING AND DECORATING

MATERIALS

U.1 Colour range

Painting and decorative schemes shall be carried out in colours selected by the Architect from the approved range of colours.

U.2 Approval of brands

The Contractor shall seek, in writing, approval from the Architect for all brands of paint he wishes to use.

U.3 Quality of products

Where a type of paint is produced by the manufacturer in more than one quality, only paints and materials of the first or best quality shall be used in the works. The Container label shall indicate clearly the quality of the paint used.

Where it is not evident that the first or best quality of paint is being used, the Architect will order the removal of such materials from site and rectification of any work executed with those materials, all at the Contractors expense

U.4 Delivery

All paints, varnishes, distempers and other surface coatings shall be delivered in sound, sealed containers labeled clearly by the manufacturer, the label or decorated container stating:-

- (a) the type of products
- (b) the brand name, if any
- (c) the use for which it is intended
- (d) the manufacturers batch number
- (e) the quality of the contents where more than one quality is available.

The label shall be a printed label; typewritten labels will not be accepted.

The batch deliveries shall be dated and used strictly in order of delivery.

No paint, other than water based paints and bituminous paint shall be delivered in containers exceeding 5 litres capacity.

U.5 Same makers materials used for coatings

While materials for the works may be obtained from several makers, undercoats and finishing coats for a particular surface must be (obtained from the same maker, (i.e. one maker's finishing coat must be applied over another maker's undercoat)

U.6 Information and facilities to suppliers

The Contractor shall supply the paint manufacturers with all relevant details of the materials required to comply with the descriptions in this Document and

the manufacturers shall be given every facility for inspecting the work during progress in order to ascertain that the materials are being used in accordance with their instructions, and they are to take samples of their products from the site if they so desire.

Specification

Painting Decorating

(2/U/4)

U.7 Storage

All materials shall be kept in a dry, clean store, protected from the elements.

U.8 Remedying defects due to defective materials

All materials, which in the opinion of the Architect are unsatisfactory, shall be immediately removed from the site, and any work executed with such defective materials shall be made good by the Contractor, at his own expense, to the satisfaction of the Architect.

U.9 Knotting

Knotting shall comply with B.S. 1336

U.10 Stopping

- (a) plasterwork shall be a plaster based filler
- (b) concrete, rendering or blockwork, shall be of similar material to the background and shall be finished with a similar texture
- (c) asbestos cement and asbestos based insulating board, shall be a composition of asbestos filler cement
- (d) internal woodwork, hardboard, fibreboard and plywood, shall be putty complying with B.S. 544, and shall be tinted to match the colour of the undercoat
- (e) external woodwork, shall be white lead paste with or without the addition of red lead complying with B.S. 217, type 2, and gold size, and shall be tinted to match the colour of the undercoat
- (f) clear finished woodwork, shall be a stopping tinted to match the surrounding woodwork.

U.11 Linseed oil

Refined linseed oil shall comply with B.S. 242

Raw linseed oil shall comply with B.S. 243

Boiled linseed oil shall comply with B.S. 242

U.12 White spirit

White spirit shall comply with B.S. 245

U.13 Size

Size shall comply with B.S. 3357

U.14 Cement paint

Cement paint shall be 'Snowcem', 'Cempexo', or other approved

U.15 Emulsion paint

Emulsion paint (interior and/or exterior), shall have a P.V.A. base and shall be of an approved brand. The first coat shall be thinned in accordance with the manufacturer's instruction. Where described as applied externally, the paint shall incorporate an approved fungicide to prevent fungus growth.

Specification

Painting and Decorating

(2/U/5)

U.16 Black bituminous paint

Black bituminous paint shall comply with B.S. 3416 Type 1 for general use, type 2 for drinking water tanks.

U.17 Primer for alkaline surfaces

Primer for alkaline surfaces shall be a special primer obtained from the maker of the undercoat and finishing coat.

U.18 Primer for aluminium

Primer for new or weathered aluminium shall be zinc chromate priming paint in accordance with DEF 1039.

U.19 Primer for bituminous surfaces

Primer for bituminous surfaces to be finished with oil paint shall contain leafing aluminium flake.

U.20 Primer for iron and steelwork

Primer for iron and steelwork shall be:-

- (a) lead based priming paint complying with B.S. 2523
- (b) calcium plumbate priming paint complying with B.S 3698 Type A

U.21 Primer for zinc or galvanized steel

Primer for weathered or new zinc and galvanized surfaces shall be calcium plumbate paint complying with B.S. 3698 Type.

U.22 Creosote type preservative

Creosote type preservative shall comply with B.S 144 or 3051.

U.23 Non creosote type preservative

Non creosote type preservative shall be 'Brunophen No. 2', "Rentokil QD" or other approved.

U.24 Primer for hardboard

Primer for hardboard, not factory primed or sealed, shall be a suitable primer obtained from the maker undercoat and finishing coat.

U.25 Primer for woodwork

Primer for woodwork, other than the internal surfaces of external doors, windows and their frames and the backs of frames and linings, etc, in contact with masonry concrete or plaster, shall be leadless white or light grey priming paint not darker than colour 0-093 of B.S. 4800 which shall be compatible with the subsequent coats and obtained from the same maker.

Primer for external woodwork and the internal surfaces of external doors, windows, and their frames, and the backs of all frames linings, etc., in contact with masonry, concrete or plaster shall be lead based pink priming paint complying with B.S. 2523.

Specification

Painting and Decoration

(2/U/6)

U.26 Oil paints

Hard gloss, semi-gloss matt and flat oil paints, and respective undercoats, shall be of approved brands.

U.27 Polyurethane lacquer

Polyurethane lacquer shall be an approved single or two pack lacquer described as of interior or exterior quality, as appropriate.

U.28 Decorative wood stain

Decorative wood stain shall be Pinotex as manufactured by Sadolins Paints (T) Ltd, or other equal and approved.

PREPARATION OF SURFACES

U.29 Approval

The preparation of all surfaces must be seen and approved by the Architect before any coatings are applied.

U.30 Stopping

Stopping referred to in the following clauses shall be the appropriate stopping hereinbefore described.

U.31 Plaster, rendering, concrete, block work and brickwork

All plaster or mortar splashes, etc., shall be removed from plaster, rendering, concrete, block work and brickwork by careful scraping; all holes, cracks, etc., shall be stopped and the whole of the surfaces shall be brushed down to remove dust and loose materials. In addition, all traces of mould oil shall be removed from concrete surfaces by scrubbing with water and detergent and rinsing with clean water to remove all detergent.

When efflorescence has occurred, or is suspected, painting shall be differed for a period as required by the Architect.

U.32 Asbestos cement

All plaster or mortar splashes, etc., shall be removed from asbestos cement by careful scraping; all oil and grease spots shall be removed with white spirit; all holes shall be stopped and the whole of the surfaces brushed down to remove dust and loose materials.

U.33 Lead and copper

Lead and copper surfaces shall be washed with soap and water, roughed with abrasive paper and washed with white spirit.

U.34 Aluminium

Aluminium surface shall be washed with white spirit and either carefully roughed with abrasive paper or treated with etching solution in accordance with the maker's instructions.

U.35 Iron or steel

Before fixing, all rust and scale shall be removed from iron and steel surfaces by wire-brushing, scraping, hammering, flame cleaning, etc.

Specification

Painting and Decorating

(2/U/7)

U.36 Zinc and galvanized surfaces

Zinc and galvanized surfaces shall be washed with white spirit.

U.37 Hardboard

All dirt and grease shall be removed from hardboard surfaces. After priming, all nail holes and other imperfections shall be stopped.

U.38 Fibreboard

All dust shall be brushed off from fibreboard surfaces, after priming, all nail holes and other imperfections shall be stopped.

U.39 Plywood

Surfaces of plywood to be painted shall be as required with a plaster based filler for internal work, and a filler, as described in clause U.10 (e), for external work, and then rubbed down and all dust and loose materials brushed off.

After priming, all imperfections shall be stopped rubbed down and brushed off

U.40 Woodwork to be painted

Before fixing woodwork, all surfaces which will be visible after fixing, shall be rubbed down and all knots and resin pockets shall be scorched back and coated with knotting.

After priming and fixing, all nail holes and other imperfections shall be stopped and the whole surface shall be rubbed down and all dust brushed off.

U.41 Woodwork to receive clear finish

All holes and other imperfections in surfaces to receive a clear finish, shall be stopped and the whole surface shall be rubbed down and all dust brushed off.

WORKMANSHIP

U.42 Standard of workmanship

Prior to the commencement of internal or external decoration, areas not exceeding 50 square metres in total area, and designated by the Architect, shall be completely decorated, and after approval shall be used as a standard for the whole of the works. Any additional cost involved in carrying out such decoration in advance of the general work shall be deemed to be included in the Contract Sum. Such decorated surfaces shall be made good and touched up as necessary prior to the handing over of the works.

U.43 Stirring of materials

The contents of all cans and containers of all materials must be properly and thoroughly stirred before and during use and shall be suitably strained as and when necessary.

U.44 Manufacturers instructions

All materials shall be used strictly in accordance with instructions, issued by the manufacturers concerned. The addition of thinners, driers or other materials will only be permitted when specially required by the maker and as when the procedure is approved by the Architect.

Specification

Painting and Decorating

(2/U/8)

U.45 Brush work

Unless otherwise described, all coatings shall be applied by brush. Written permission must be obtained from the Architect for the application of coatings by spray or roller where not so described, and if permission is granted, such application shall not result in extra cost to the Employer.

U.46 Priming of joinery

Joinery shall be delivered to the site unprimed and is to be protected from rain and damp during transit. It is to be stored in clean, dry, ventilated structures and no primer shall be applied while the timber is in any way damp. The store and drying room shall be of adequate size to allow for proper coating and storage of primed work. Primers shall be applied as soon as possible after inspection and acceptance of the joinery by the Architect.

U.47 Condition of priming

If, by the time that the work is to receive the first undercoat, the priming coat has in any way deteriorated, or has been damaged, the affected portions or the whole, if necessary, shall be rubbed down and re-primed.

In the case of articles primed at works, the priming shall be touched up where required with a similar primer.

U.48 Coatings to be dry

All coatings shall be allowed to dry thoroughly before succeeding coats are applied.

U.49 Rubbing down

All undercoats for oil paints and clear finishes shall be rubbed down to a smooth surface with abrasive paper, and all dust removed before the succeeding coat is applied.

U.50 Differing colours of undercoats

Each succeeding coat of priming and undercoating paint shall be sufficiently different in colour as to be readily distinguishable.

U.51 Painting in unsuitable conditions

No coating shall be applied to surfaces affected by wet, damp, or other unsuitable conditions, or to any surface damp with moisture.

U.52 Protection of wet surfaces

Adequate care must be taken to protect surfaces while still wet, by the use of screens and 'wet paint' signs, where necessary.

U.53 Damage to adjoining surfaces

Care must be taken when storing materials, preparing surfaces or painting, etc., not to damage or stain other work. The contractor shall remove all such stains, make good, and touch up.

U.54 Cleanliness

All brushes, tools and equipment shall be kept in a clean condition and surfaces shall be clean and free from dust during painting.

Painting shall not be carried out in the vicinity of other operations which might cause dust.

Specification

Painting and Decorating

(2/U/9)

U.54 Cleanliness (Contd)

The contractor shall provide a suitable moveable receptacle, into which are to be placed all the liquids, slop washings, etc., which are on no account to be thrown down any of the gullies, manholes, sinks, lavatories, W.C.'s or any other sanitary fittings. All solid refuse or inflammable residues must be removed from the site, or burned.

U.55 Removal of ironmongery, etc.

All surface fixed ironmongery fittings, etc., except hinges, shall be removed before painting and re-fixed on completion.

U.56 Method of measurement

One coat of lead based pink primer has been measured to the backs of all timber frames, etc., which will ultimately be fixed in contact with concrete, block work, rendered or plastered surfaces.

Specification

Painting and Decorating

(2/U/10)

DRAINAGE

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- V.1 Preambles to other sections
- V.2 Notices
- V.3 Drainage By-Laws
- V.4 Inspections
- V.5 Levels of existing drains

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- V.6 Plastic pipes and fittings
- V.7 Spun cast iron drain pipes and cast iron fittings, gullies, etc.
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V.11 Setting out

V.12 Excavation

V.13 Planking and strutting

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V.15 Laying and strutting

V.16 Plastic drains

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Specification

Drainage

(2/V/1)

V.22 Bedding and sealing covers and frames

V.23 Testing

V.24 Clean and flush all drains

V.25 Method of measurement

Specification

Drainage

(2/V/2)

DRAINAGE

GENERALLY

V.1 Preambles to other sections

The preambles contained in other sections of this Document shall apply equally hereto where applicable, so far as is consistent with the clauses following.

V.2 Notices

The Contractor shall give all requisite notices to the local Authority.
Uncoloured plans will be supplied by the Architect at the Contractor's request.

V.3 Drainage Bye-laws

All of the works shall comply with the requirements of the drainage Bye-laws made by the Local Authority and shall be executed to the satisfaction of the Architect and the Local Authority.

V.4 Inspections

The Contractor shall give written notice to the Architect for the purpose of inspection and measurement, whenever sections of:-

- (a) excavations are completed
- (b) concrete beds are laid
- (c) drains are completed

and no further work shall be executed until each stage of the work has been inspected.

V.5 Levels of existing drains

The contractor shall check the invert levels of existing drains, sewers, and manholes before laying new drains, and shall notify the Architect immediately if the declared invert levels are found to be inaccurate.

MATERIALS

V.6 Plastic pipes and fittings

Plastic pipes and fittings shall be obtained from a manufacturing source approved by the Architect in writing to comply with B.S. 5481 in unplasticised PVC with spigot and socket and /or loose joints. All bends are to be long radius easy bends. Branches shall be infection moulded. Fittings fabricated on site will not, under any circumstances, be permitted.

V.7 Spun cast iron drain pipes and cast iron fittings gullies etc.

Spun cast iron drain pipes shall be coated centrifugally cast (spun) iron pipes complying with B.S. 4622.

Fittings, gullies, etc. shall be of coated cast iron and shall comply with B.S. 4622.

V.8 Concrete pipes and fittings

Concrete pipes and fittings shall comply with B.S. 59911 Parts 1 to 3. They shall be reinforced, and of sulphate resisting cement if specified.

Specification

Drainage

(2/V/3)

V.9 Manhole covers and road gratings

Manhole covers and road gratings and frames shall comply with B.S. 497

V.10 Step irons

Step iron shall be galvanized malleable cast iron complying with B.S. 1247.

WORKMANSHIP

V.11 Setting out

The Contractor shall set out all drains in accordance with the drawings, and provide all profiles, etc., necessary for the execution of the work.

V.12 Excavation

The bottoms of all excavations shall be trimmed and consolidated to the correct levels. Unauthorized excavations below the required levels shall be filled with concrete of the same composition as for drain beds, at the Contractor's expense.

Where the bottom is insufficiently firm, the Contractor shall excavate until, in the Architect's opinion, a firm bottom is obtained and the level shall be made up with concrete of the same composition as for drain beds. Particulars of such additional work shall be agreed with the Architect's representative before the work is covered up, otherwise no claim in this respect will be entertained.

V.13 Planking and strutting

Care shall be taken not to undermine the foundation of the buildings and, if so directed by the Architect, planking and strutting shall be left in, or other means adopted to protect the foundations. Details of such additional items shall be agreed with the Architect's representative before the work is covered up, otherwise no claim in this respect will be entertained.

V14 Backfilling

Trenches for plastic pipes shall first be filled with selected screened excavated material carefully hand-tamped between the pipe and sides of the trench, followed by 150 mm- 200 mm of similar material before the general filling is carried out.

Trenches for concrete or cast iron drains shall first be filled to a depth of 300 mm with selected fine material carefully hand-packed around the pipe. On no account shall materials be tipped into the trench until the first 300 mm has been completed.

Filling shall be continued in layers not exceeding 300 mm thick well rammed and, if necessary, watered.

V.15 Laying drains

Drains shall be laid truly straight on line and gradient with sockets upstream and the full bore shall be unobstructed.

V.16 Plastic drains

Plastic drain pipes shall be laid and jointed with solvent welded joints entirely in accordance with the manufacturers instructions.

Pipes shall be bedded in sand after all hard obstructions have been removed from trench bottoms.

Specification

Drainage

(2/V/4)

V.17 Cast iron drains

Cast iron drains shall be laid on concrete beds where specified or shown on the drawings and shall be jointed with a gasket of hemp, well caulked, to a dept of 30 mm for 100 mm pipes and 40 mm for larger pipes, and remainder of the socket shall be filled with molten lead or lead fibre solidly caulked.

Connection of iron to concrete drains shall be jointed as described for concrete drains.

Cast iron drains fixed to walls or beams shall be supported on brackets at 1,350 mm centers.

Gullies, outlets, etc., on drains under concrete floors shall be set in position at correct levels before the floors are laid.

V.18 Concrete drains

Concrete drains shall be jointed with one turn of tarred gasket, well caulked and the remainder of the socket filled with cement and sand, (1:3), finished with an angle around the pipe. All surplus mortar shall be removed from the inside of the pipe with a badger. Where pipes are sulphate resisting, the joining mortar shall contain sulphate resisting cement.

V.19 Concrete beds, haunches and coverings

Where specified or shown on drawings, drains shall be laid on concrete, (13.5 N/sq. mm 25 mm aggregate), beds 100 mm thick, 400 mm wide for 100 mm diameter drains and 450 mm wide for 150 mm diameter drains. The concrete shall be haunched up both sides of the barrel to give lateral support.

Where drains, other than cast iron drains, are laid under buildings or pavings carrying vehicular traffic, they shall be completely surrounded in concrete, (13.5 N/sq.m 25 mm aggregate) 150 mm thick, (i.e. 400 mm x 400 mm overall for 100 mm pipes and 450 mm x 450 mm overall for 150 mm pipes). Where directed, drain beds shall be reinforced.

Gullies shall be bedded and surrounded in concrete 13.5 N/sq.m - 25 mm aggregate minimum 150 mm all round.

V.20 Sleeves

All drains passing through walls or foundations shall have sleeves of cast iron pipe of sufficient size to allow a clearance round the drain.

V.21 Benching

Benching in bottom of manholes shall be concrete (13.5 N/sq.m - 25 mm aggregate) to falls of not less than 10 to channels finished with cement and sand (1:2), 25 mm thick, trowelled hard and smooth with all angles rounded.

V.22 Bedding and sealing covers and frames

Frames to manhole covers shall be bedded in cement mortar (1:3) and the covers in grease and sand.

V.23 Testing

All drains and manholes shall be tested water-tightness and straightness to the satisfaction, and in the presence of, the Architect and the Local Authority. Drains shall be filled with water to a head of 1.50 metre and are to be tested in sections agreed with the Architect:-

- (i) after jointing

Specification

Drainage

(2/V/5)

V.23 Testing (Cont'd.)

- (ii) after haunching and backfilling
- (iii) after completion of the works

The Contractor shall provide all necessary testing apparatus and shall carry out such other tests as are required by the Architect and the Local Authority.

V.24 Clean and flush all drains

All drains, gullies, manholes, etc., shall be cored, and flushed on completion.

V.25 Method of measurement

Where not otherwise stated, the starting level for trench and manhole excavation shall be:-

- (i) the formation level in areas where the site is excavated to reduce levels
- (ii) existing ground level in areas where no excavation is required, or where filling is required.

The depth of all the trenches in the following description lie within the same 1.50 metre stages as the average depths stated.

Prices for excavating pipe trenches shall be deemed to include keeping them free from general water (i.e. all water except spring or running water).

Notwithstanding the provisions of SMM Clause V7 (a) to (c) the descriptions of excavating manholes, yard gullies, septic tanks and soakpits shall be deemed to include grading bottoms, planking and strutting, return filling and compacting, disposal of surplus soil and keeping excavations free from water.

Prices for building pipes into manholes shall include for building-in on rake where necessary.

Prices for concrete beds, benching and coverings for pipes laid in trenches, shall be deemed to include for any necessary formwork. Formwork required for beds, etc., for pipes above ground, and for casing to vertical pipes, is referred to in the descriptions of such items.

Prices for all gullies shall be deemed to include for all necessary excavation, return filling, disposal of surplus excavated material, planking and strutting, and trimming and ramming bottoms.

Specification
Drainage

(2/V/6)
EXTERNAL WORKS

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External Works

(2/W/1)

W.24 Diversion of water

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W.26 Soiling on slopes and verges

W.27 Base, sub-base and surfacing or granular materials

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W.32 Premix bitumen macadam surfacing

W.33 General remarks on surfacing

W.34 Tolerances for thickness of pavements

W.35 Laying pre-cast paving slabs

W.36 Grassing

Specification

External Work

(2/W/2)

EXTERNAL WORKS

GENERALLY

W.1 Preambles to other bills

Preambles contained in other sections of this Document shall apply equally to this section so far as is consistent with the following clauses.

W.2 Inspections

The Contractor shall give written notice to the Architect for the purpose of inspection and measurement, whenever sections of:

- (a) excavations and preparation of sub-grade are complete
- (b) sub-grade drainage is complete
- (c) sub-base course is complete
- (d) base course is complete

MATERIAL

W.3 Soil for planted areas

Soil for planted areas shall be vegetable soil free from roots and rubbish and treated with weed killer to prevent the growth of weed.

W.4 Sand for filling under footpaths

Sand for filling under footpaths, shall be clean, dry pit or river sand, free from vegetable soil, roots and rubbish.

W.5 Granular materials for sub-base, base and surfacing

.....
.....

Base and Sub-base Base, Sub-base and Surfacing

.....

B.S. Sieve
Size

Percentage passing

.....

Nominal maximum size

.....
.....

75 mm 38 mm 19 mm 9.5 mm 4.75 mm

.....
.....

75 mm	100	-	-	-	-
	38 mm	80-100	100	-	-
-					
19 mm	60-80	80-100	100	-	-
9.5 mm	30.65	40-75	80-100	100	-
4.75 mm	25-55	30-60	50-85	80-100	100
2.36 mm	20-45	25-50	35-70	50-80	80-100
0.425 mm	10-30	15-30	15-35	25-50	25-55
0.075 mm	5-15	5-15	5-15	10-25	10-25
.....					
.....					

The 9.5 mm and 4.75 mm nominal size materials may have up to 35% of stones not larger than 38 mm (1.5 in) provided that the materials passing the 4.75 mm (3/16 in) sieve is within the limits specified.

Specification
External Works

(2/W/3)

W.5 Granular materials for sub-base, base and surfacing (Contd)

Not less than 10% should be retained between each pair of successive sieves, excepting the largest pair.

Furthermore the materials shall fulfill the following requirements.

W.6 Base

The CBR value shall not be less than 80% when tested at B.S. Heavy compaction (soaked condition).

Plasticity index : 0-6%
Liquid limit : 0-25%
Linear Shrinkage : 0-4 %

W.7 Sub-base

The CBR value shall not be less than 25% when tested at B.S. Heavy Compaction (soaked condition).

Plasticity index : 0-15%
Liquid limit : 0-35%
Linear Shrinkage : 0-8 %

W.8 Surfacing

Climate	Plasticity Index	Liquid Limit	Liquid Shrinkage	Linear
.....				
.....				

Wet	4 – 9%	0 – 35%	2 – 4%
Seasonal wet	6 – 15%	0 – 40%	3 – 7%

.....

This specification shall also apply to materials for shoulders

In case the gravel surfacing is a temporary surface only, and the layer at a later stage shall constitute sub-base in a bitumen surfaced road, then the material shall meet the CBR requirement to sub-base material.

W.9 Macadam

The material shall consist of coarse and fine aggregate derived from crushed hard rock of approved quality.

The coarse aggregate for macadam shall comply with the 50 mm or 40 mm nominal sizes of B.S. 63. The fine aggregate shall all pass the 5 mm sieve.

The coarse aggregate shall be of approximately cubic shape, have at least one fractured face and with an insignificant amount of elongated or flaky particles.

The flakiness index must not exceed 40. the aggregate crushing value must not exceed 35%.

W.10 Aggregate for premix macadam surfacing

Aggregate for premix bitumen macadam surfacing shall consist of natural rock aggregate complying with B.S. 1621.

W.11 Chippings

Chippings for blinding 1st and 2nd seal-coat shall be single sized road stones conforming to B.S. 63 – Single sized (Cont'd.)

Specification

External Works

(2/W/4)

W.11 Chippings (Cont'd.)

Road Stones and Chippings. Samples of all grades of stones and chippings shall be submitted to the Architect for approval before any is delivered to the site.

1st wearing Coat : 14 mm nominal size chippings

2nd wearing Coat : 10 mm nominal size chippings

W.12 Blinding

Blinding shall be 4 mm gauge hard stone chippings, free from clay dust or other deleterious matter.

W.13 Precast concrete pavings slabs

Precast paving slabs shall comply with B.S. 368 except for sizes.

W.14 Kerbs

Precast concrete kerbs shall comply with B.S. 340, and shall be finished true and smooth on all exposed faces.

W.15 Prime coat

The prime coat for macadam paving shall be bitumen grade M.C.70. The temperature at application shall be 55-80C.

W.16 Bitumen

Bitumen for first and second wearing coats shall be cutback bitumen grade M.C. 3000. The temperature at application shall be 120-140C.

Bitumen for premix bitumen macadam shall be grade 80/100 bitumen.

WORKMANSHIP

W.17 Generally

The sub-grade, sub-base and course for roads and parking areas shall be prepared and laid at a convenient time before completion of the contract, as shall be agreed between the Architect and the Contractor, together with their kerbs and foundations.

The wearing course shall be applied at a later date, and prior to laying the base course shall be made good in accordance with the requirements specified herein. The Contractor shall make good at his own expense, any damage to kerbs.

W.18 Surveying

The contractor shall verify all dimensions and levels prior to the commencement of the work.

All surveying necessary for the accomplishment of the work shall be done by the contractor at his own expense, and he shall give notice of his intention to carry out such work in order that arrangements can be made for supervision and checking. The contractor shall also provide without extra charge all

necessary instruments, appliances, labour and any other materials required for checking the survey work. (Cont'd.)

Specification

External Works

(2/W/5)

W.18 Surveying (Cont'd.)

The Contractor shall make all necessary surveys using given bench marks as reference points. These bench marks shall carefully be preserved.

The Contractor shall draft, in accordance with these surveys, all plans and drawings which are necessary for the completion of the work, and shall submit these plans and drawings to the Architect for approval in writing.

W.19 Levels, falls, cross falls and cambers

The works shall be executed to the levels, falls, cross falls and cambers shown on the drawings.

W.20 Tolerances

The finished sub-grade and shoulder levels shall at no place vary more than 15 mm above or below the levels shown on the Drawings. Deviations shall not be one sided.

Sub-grade that does not conform to the above requirements shall be reshaped to conform to the specified tolerances and re-compacted, at the contractor's expense.

Invert levels to ditches shall not vary more 50mm from the levels shown on the drawing. The deviation from the gradient specified on the drawing shall not exceed 0.2 times the gradient specified.

On slopes irregularities shall not exceed 100 mm.

The Contractor shall establish 25 mm x 25 mm x 100 mm timber pegs outside the carriageway each 20 m on both sides painted with the chainage, and giving the level to the finished road surface. The pegs shall be preserved until the Architect has approved the completion of the road.

The contractor shall provide one accurate straightedge. The straight edge shall be constructed of stout timber, angle iron or metal tubes so as to span 3 metres without deflection. If of timber, the edge shall be shod with steel plate in the width of the timber and at least 5 mm thick.

W.21 Preparing ground surfaces under embankments

The Contractor shall ensure that the natural ground is cleared of vegetation rubbish and soft and wet materials unsuitable for embankments construction.

All necessary work to drain the natural ground shall be executed. Slopes greater than 1 in 3 shall be formed into horizontal terraces not less than 2 m wide.

W.22 Construction of embankments

Embankment material shall be placed in successive layers not exceeding 150 mm after compaction unless the contractor proves by testing to the Engineer's satisfaction that his compaction equipment is able to compact in greater layers. Each layer shall extend over the full width of the embankment and shall be compacted according to requirements before the next layer is placed.

It is the Contractor's responsibility that only approved materials are incorporated in the embankments. If any unsuitable or oversize material or materials is included it shall be removed and replaced with suitable material.

In forming embankments, the Contractor shall make due allowance in height and width for consolidation and shrinkage. On the completion of the Contract, the level, widths and dimensions of the finished surface of the carriageway or embankment shall correspond to the levels and dimensions shown on the Drawings. (Cont'd.)

Specification

External Works

(2/W/6)

W.22 Construction embankments (Cont'd.)

Where the CBR value of the fill material obtained from general excavation is less than 8% at B.S. Compaction after 48 hours soaking then the engineer shall instruct the Contractor to provide selected fill in the upper layer or layers of the embankment. The thickness of the selected fill material shall be determined by the Architects Representative.

In cutting where the soaked CBR value of the sub-grade is lower than 8% the Architect shall similarly instruct the Contractor to replace the upper layer or layers with selected fill material.

The fill material shall preferably be to the following requirements:-

Liquid Limit	:	0-45%
Plasticity Index	:	0-20%
Linear shrinkage	:	0-10%

W.23 Compaction

All fill and sub-grade shall be compacted to at least 100% of the maximum dry density obtained in the B.S. Standard Compaction as follows:-

Top 150 mm of natural ground before filling

all fill in embankments

Top 300 mm of formatting in both cut and fill

The Contractor shall when needed for proper compaction distribute and incorporate water in the layer of fill to be compacted.

When the moisture contents in some material is in excess of that for proper compaction the wet material shall be allowed to dry before compaction is commenced.

W.24 Diversion of water

Excavation and filling operations shall be carried out with side slopes so that water can run off the surface. The Contractor shall at his own expense maintain sufficient drainage of the works to prevent pounding and scour.

W.25 Testing

All testing shall comply with the requirements of B.S 13777.

The Contractor shall determine the dry density of compacted earthwork at the following minimum frequencies. The result of the Contractor's findings shall be submitted to the Architect who may approve or reject a volume of compacted earthwork on the evidence of the Contractor's tests or he may carry out test himself in addition:

- (i) The top 150 mm of the compacted original ground under embankments in areas where compaction is specified or has been ordered by the Architect: 1 density test per 1000 sq.m.
- (ii) All fill in embankments except the top layer: 1 density test per 1000 sq.m..
- (iii) Formation in cutting and fill: 1 density test per 400 sq.m..

The Contractor shall carry out a B.S Standard Compaction test including CBR TEST AND A SET OF Atterberg Limit tests on soil samples from at least every tenth dry density determination test carried out as above. He shall also carry out a B.S standard Compaction test on soil sample from any dry density determination which failed to reach the specified percentage of the soil which it is related in the above mentioned 1:10 representative grouping.

W.26 Soiling on slopes or verges

Where it is directed and/or shown on the Drawings that the slopes of embankments, slopes of cuttings and verges shall be covered with a layer of top soil, such top soil shall be laid to a compacted thickness of 100 mm or as specified by the Architect.

W.27 Base, sub-base and surfacing of granular materials

The spreading and compaction of material must be carried out in such a manner that segregation is avoided. The layer must be uniformly compacted to at least 100% of the maximum dry density obtained at the B.S. Heavy Compaction Test.

Compaction should be done with a vibrating roller having a mass of at least 1800 kg per meter width of vibrating roll and finished to a smooth even surface with a static smooth-wheel roller.

The Contractor shall set out sufficiently leveling points, each 20 m. On both sides of the road for the control of the thickness of the layer.

Simultaneously with compaction the layer must be made true to shape and level so that no point of the finished layer deviates more than 15 mm from the stipulated levels. Deviation shall not be considered.

Filling in of depressions must only be done through previous scarification and re-compaction to a homogenous layer.

W.28 Macadam

The course aggregate shall be laid by mechanical plant to a thickness within the range 75-100 mm and given by a smooth-wheeled roller having a mass per meter of at least 2500 kg on at least one roll. The fine aggregate shall then be spread on it to a thickness of approximately 25 mm by a suitable spreading machine and vibrated into the voids of the course aggregate by a vibrating plate compactor having a mass per unit area of the base plate of at least 1400 kg/sq.m. or a vibrating roller having a mass per metre width of vibrating roll of at least 1800 kg.

The operation of spreading and vibrating the fine aggregate shall be repeated as necessary until no more will penetrate into the layer of coarse aggregate and no hungry patches are visible on the surface, when it shall be brushed to remove the excess fines and leave the coarse aggregate standing 3-6 mm proud. The layer shall then be rolled with a smooth-wheeled roller having a mass per metre width of at least 5000 kg on at least one roll.

The whole operation shall be repeated as necessary to provide the full specified thickness of road base.

W.29 Prime coat

Before application of bitumen prime coat, the base course shall be inspected and approved by the Architect. Any discrepancies shall be made good to the Engineer's approval before any work on the wearing course may start.

Prior to the application of the prime coat the surface of the base shall be swept clean of loose sand and dust and other foreign matter.

Bitumen for the prime coat shall be applied at a rate of approximately 0.8 litres/sq.m. in one even layer. After the prime coat has been applied the stretch of road shall be closed to traffic for 24 hours to allow the primer to soak into the surface.

In case it is not possible to close the primed stretch of road the prime coat shall be blinded with sand or
Crusher fines at a rate of approximately 5kg/sq.m..

Specification

External Works

(2/W/8)

W.30 First seal-coat

Prior to application of the first wearing coat the primed surface of the base-course must be carefully inspected, all areas found to be holding an excess of bitumen shall be blotted with sand or crusher fines, and all areas found to be deficient shall be made good, all to the satisfaction of the Architect.

Bitumen for the first wearing coat shall be applied at a rate of approximately 1.0 litre/sq.m. and blinded with 14 mm chippings at a rate of 13-15 kg/sq.m.. The bitumen temperature at application shall be 120-140C and the chipping shall be completely dry, clean and free of dust.

The chippings shall be uniform spread over the binder film by a mechanical spreader, except where its use is impracticable. Any thinly chipped areas left by the spreading machine shall have additional chippings spread by hand to ensure complete cover.

The chippings shall be pressed into the binder by an approved pneumatic tyred multi-wheel roller moving slowly. The surfacing shall if possible be closed for traffic for 24 hours after finishing the first wearing-coat. The Contractor shall thereafter make arrangement, e.g. by erecting signposts or the like, to prevent excessive speeding, not more than 40 km/h for 48 hours after the surfacing has been opened for traffic.

W.31 Second seal-coat

When the surfacing has been opened to traffic for a period to be agreed between the Architect and the Contractor the second wearing-coat shall be applied. Before application the first coat shall be made good. Excessive and loose chippings shall be brushed off so that the road surface appears with a firm even and clean texture to the satisfaction of the Architect.

Bitumen for the second wearing-coat shall be applied at a rate of approximately 1.1 litre/sq.m. and blinded with 10 mm single sized chippings at a rate of 10-12 kg/sq.m.. The bitumen temperature at application shall be 120-140C and the chippings shall be completely dry, clean and free of dust.

The chippings shall be uniformly spread over the binder film by a mechanical spreader, except where its use is impracticable. Any thinly chipped areas left by the spreading machine shall have additional chippings spread by hand to ensure complete cover.

The chippings shall be pressed into the binder by an approved pneumatic tyred multi-wheel roller moving slowly. Surplus chippings shall be afterwards removed.

The surfacing can be opened to traffic when the second wearing-coat is finished, but the Contractor shall make arrangements, e.g. by erecting sign posts or the like, to prevent excessive speeding of not more than 40 km/h for 48 hours after finishing.

W.32 Premix bitumen macadam surfacing

Premix bitumen macadam surfacing shall consist of a premix macadam carpet of 500/700 grade bitumen and approved quality aggregate graded and mixed together prior to laying to the proportions and by the methods given in B.S. 4987, laid to finish to the thickness shown after compaction. The compaction shall be achieved with six to eight tonne roller.

W.33 General remarks on surfacing

The plant used by the Contractor for transporting, heating and spreading bitumen shall be an approved rubber tyred unit fitted with an efficient thermometer and heating control. The distributors shall be equipped to provide a constant rate of bitumen per square metre of surface at the full width of the work and there shall be a visible speedometer indicating the speed of the vehicle in metre per minute. (Cont'd.)

Specification

External Works

(2/W/9)

W.33 General remarks on surfacing (Cont'd.)

Application of bitumen for prime coat or wearing coats must not take place when the road is wet after rain, while it is raining or when rain is likely to be expected shortly after the surface dressing is finished.

Measurements shall be taken to prevent overlapping of surface dressing at both transversal and longitudinal joints. At longitudinal joints either blinding off the already treated surface or by blocking off the distribution aggregate to the required width. At transversal joints the already treated surface shall be blinded off so that the spreading of bitumen can be started at the exact right moment, and when the spreading unit operates at the correct speed.

Hand spreading of bitumen shall be employed to touch up areas unavoidably missed by distributor.

W.34 Tolerances for thickness of pavements

The nominal thickness of surface dressing is for practical purpose assumed to be zero.

No layer in the pavement shall deviate more than 10% from the nominal thickness. The total pavement thickness shall not deviate more than 5% from that specified.

Deviation shall not be one sided.

W.35 Laying precast paving slabs

Precast paving slabs shall be bedded on a sand bed compacted to the thickness specified with 6 mm wide joints, filled and pointed with cement mortar coloured to match the colour of the slabs and recessed 5 mm deep. The paving shall finish true and even to the falls shown on the drawings with no surface irregularities.

W.36 Grassing

Grassing shall be carried out by a Specialist using approved local grass. Prices for grass shall include for tending, watering, cutting and keeping weed free for a period of six months, to produce a dense and healthy "weed" free grass carpet.

Specification

External Works

(2/W/10)

TERMITE TREATMENT OF EXISTING DWELLINGS

LIST OF CLAUSES

GENERALLY

- X.1 Engineers requirements

MATERIALS

- X.2 Anti-termite treatment

WORKMANSHIP

- X.3 Method of treatment

- X.4 Inspection

- X.5 Guarantee

Specification

Termite treatment

(2/X/1)

TERMITE TREATMENT OF EXISTING DWELLINGS

GENERALLY

- X.1 Engineers requirements

The Engineer shall require the termite treatment to be carried out in accordance with accepted good practice. Additional detail concerning method of treatment shall be provided by the Engineer upon request. The Main Contractor shall be required to employ a competent sub-contractor to be approved by the Engineer to carry out the application of chemicals used in termite treatment.

MATERIALS

- X.2 Anti-termite treatment

Refer to General Specification (2/D/6) item D.24 for specification of materials and mix proportions.

The Contractor shall comply with all recommendations and instructions of the manufacturer with respect to safe mixing and application of proprietary anti-termite treatment chemicals.

The Engineer shall approve all proposed substitute or alternative materials prior to application by the Contractor.

WORKMANSHIP

X.3 Treatment to termite infestation on existing houses

Any doubt or obscurity concerning method of treatment described below or elsewhere in this document shall be referred to the Engineer who shall provide the necessary clarification to permit compliance herewith.

X.4 Method of treatment

Operation 1. Excavate trench at perimeter of building 300 mm wide x 300 mm deep position 300 mm from face of external walls.

Operation 2. Penetrate bottom of trench to a depth of 400 mm at 300 mm centres using 30 mm diameter bar, auger or similar implement.

Treat and hole with minimum 2 litres of prepared chemicals ("Gladiator TC 10% solution" or similar).

Operation 3. Treat all earth removed from the trench with minimum 80 litres of prepared chemicals ("Gladiator TC 10% solution" or similar) per cubic metre prior to using the same material for backfilling of the trench.

Operation 4. Treat surface of 300 mm wide earth strip adjacent external walls by soaking with 3 litres of prepared chemicals ("Gladiator TC 10% solution" or similar) per linear metre. At locations where pipes protrude from the surface of the ground, soak with additional 3 litres of prepared chemicals ("Gladiator TC 10% solution" or similar) at location of each pipe.

X.5 Inspection

Upon completion of excavation and forming of holes in trench bottom, the Contractor shall notify the Engineer who shall then be permitted to inspect the completed work prior to application of chemicals.

Specification

Termite treatment

(2/X/2)

X.6 Guarantee

In accordance with the provisions of General Specification (2/D/6) Clause D.24 (fifth and sixth paragraphs) the Contractor shall be required to provide a written five year guarantee to the Engineer for onward transmission to the Employer.

Specification

Termite treatment

(2/X/3)

DRAWINGS

NOTIFICATION OF AWARDS



THE REVOLUTIONARY GOVERNMENT OF ZANZIBAR
MINISTRY OF EDUCATION AND VOCATIONAL TRAINING

P.O. Box 394
ZANZIBAR-TANZANIA
Website: www.moez.go.tz

Tel: +255-24-2232728
Fax: +255-24-2233306
Email: info@moez.go.tz
pmu@moez.go.tz

Ref: P33/21/9/IMF/VOL.I/231

Date: 28th December, 2021

M/s ESTIM CONSTRUCTION COMPANY LTD
P.O. Box 19716
Dar-Es -Salaam

**NOTIFICATION OF CONTRACT AWARDS FOR PROPOSED NEW CONSTRUCTION
OF MWANAKWEREKWE PRIMARY SCHOOL (G+2) AT URBAN WEST REGION IN
UNGUJA.**

I am pleased to inform you that your tender dated 6th December, 2021 has been evaluated and the Ministry of Education and Vocational Training, Zanzibar is hereby announcing its conditional contract price is **Tanzania Shillings Three Billion Seven Hundred Ninety Four Million Two Hundred Sixty Six Thousand and Fifty One point Seven Five Only (TZS 3,794,266,051.75) including 15% VAT** is here by accepted by our agency.

You are hereby instructed to proceed with the signing of the contract within 7 days after receive of this notification of award.

You are also instructed to submit to us the performance Security before signing of the Contract.

Please contract Secretary, Ministerial of Tender Board to proceed with the signing of the contract and other formalities.

Please confirm your acceptance.

Authorized Signature:

Name and Title of Signature: Ali Khamis Juma
Principal Secretary

Name of Agency: **MINISTRY OF EDUCATION AND VOCATIONAL
TRAINING, ZANZIBAR**

Direct lines to:

Minister 2238205, Principal Secretary 2238210, Deputy Principal Secretary 2234356

KEY PERSONNEL

**PROPOSED PERSONNEL
FORM PER -1**

PAGE I OF 1 PAGE

Bidder's legal Name: ESTIM CONSTRUCTION COMPANY LTD
JVCA Partner Legal Name: N/A

Date: 04/12/2021
Bidding No. SMZ/IFM/CW 08/2021-2022

Name of Applicant	ESTIM CONSTRUCTION COMPANY LIMITED
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1	Title of Position Name of Candidate	Projet Manager/Contract representative Samir R. Jamdar
2	Title of Position Name of Candidate	Site Engineer Allen Loth
3	Title of Position Name of Candidate	Nechanical Engineer Mahendra Kerai
4	Title of Position Name of Candidate	Quantity Serveyor Salum Mpangodi
5	Title of Position Name of Candidate	Electrical/ICT Engineer Abdul Shaik
6	Title of Position Name of Candidate	Environmental Ally Abdallah
7	Title of Position Name of Candidate	Heath and Safety Mohammad M. Nassor
8	Title of Position Name of Candidate	Social Mwamvuwa T. Mwinyimvua

ESTIM CONSTRUCTION CO. LTD.
P.O. Box 19716
DAR-ES-SALAAM
TANZANIA

EQUIPMENT

3.6 EQUIPMENT

Bidder's legal Name: ESTIM CONSTRUCTION COMPANY LTD
JVCA Partner Legal Name: N/A

Date: 02/12/2021
Bidding No. SMZ/IMF/CW 02/2021-2022

PAGE 1 OF 1 PAGE

S/N	Type of Plant/Equipment	Characteristics	Minimum Number Required
1	Truck	10Ton	3
2	Pick up/Canter		3
3	Concrete mixer	1m3	4
4	Concrete poker		5
5	Wood working machine		3
6	Mobile batching truck	3m3	2
7	Concrete pump		2
8	Bar cutting and bending machine		3
9	Portable welding machine		3
10	water pump		2
11	Standby Generator		3
12	Steel scaffold minimum area to cover slab	600m2	Set
13	Compressor		3
14	Land surveying equipment (complete set)		Lots

ESTIM CONSTRUCTION CO. LTD.
P.O. Box 19716
DAR-ES-SALAAM
TANZANIA

WORK PROGRAM

MINUTES OF CONTRACT NEGOTIATION

MINUTES OF NEGOTIATION MEETING

Project: PROPOSED NEW CONSTRUCTION OF MWANAKWEREKWE PRIMARY SCHOOL (G+2) AT URBAN WEST REGION IN UNGUJA UNDER IMF PROJECT

Venue: MOEVT- MAZIZINI

Date: 23/12/2021

Time:02:00pm.

Present:

S/N	NAME	Title	Organization	Address
1.	Ali Kh. Juma	Principal Secretary	MOEVT	P.O.Box 394
2.	Mohammed Kh. Amour	Acting Head of Procurement	MOEVT	pmu@moez.go.tz
3.	Khalid M. Wazir	Director DPPR	MOEVT	P.O.Box 394
4.	Khamis R. Mtara	Civil Engineer	MOEVT	P.O.Box 394
5.	Abdallah S. Khatib	Proc. Officer	MOEVT	P.O.Box 394
6.	Salum A. Juma	Civil Engineer	MOEVT	P.O.Box 394
7.	Khamis Y. Bakar	Civil Engineer	MOEVT	P.O.Box 394
8.	Mwanaidi H. Silima	Procurement Officer	MoEVT	P.O.Box 394
9.	Habiba Y. Vuai	Procurement Officer	MoEVT	P.O.Box 394
10.	Ilham S. Said	Procurement Officer	MoEVT	P.O.Box 394
11.	Zuhura M. Dawa	Acting Chief Account	MoEVT	P.O.Box 394
12.	Hassan H. Haji	Procurement Officer	MoEVT	P.O.Box 394
13.	Jina H. Mselem	Procurement Officer	MoEVT	P.O.Box 394
14.	Rajab O. Juma	Head of Store	MoEVT	P.O.Box 394
15.	Wafaa S.Mzee	Procurement Officer	MoEVT	P.O.Box 394
16.	Emanuel W. Mushi	Engineer	Estim Construction Limited	Estim co.ltd
17.	Pasag Rahangdale	Project Manager	Estim Construction Limited	Estim co.ltd

**PROPOSED NEW CONSTRUCTION OF MWANAKWEREKWE PRIMARY SCHOOL (G+2) AT
URBAN WEST REGION IN UNGUJA UNDER IMF PROJECT**

Sub: Negotiation Meeting Minutes

AGENDA:

1. Opening of the meeting
2. Discussion on scope of works
3. Discussion on VAT exemption and withholding tax
4. Discussion on the availability of key personnel as indicated in the bids.
5. Discussion on commencement and completion of the work.
6. Payments terms and conditions
7. Any other business
8. The closing of the meeting

S/No.	Agenda item	Proposal/Action	Agreed/Resolution
1.0	The opening of the meeting	<ul style="list-style-type: none"> • Introduction, Registration • Confirmation of Agenda items 	<ul style="list-style-type: none"> • Chairperson Mr Ali Kh. Juma opened the meeting at 02:00 pm. There after members were requested to introduce themselves and register on the attendance sheet. • All members confirmed the agenda to suit the discussion and no addition agenda was proposed.
2.0	Scope of Works	<ul style="list-style-type: none"> • The client was requested to confirm if there are any changes to the scope of works. 	<ul style="list-style-type: none"> • The Client confirmed there is a Discount of 50,000,000.00 in the bidders price. The previous contract was 3,844,266,051.75 and the revised contract amount was 3,794,266,051.75.
3.0	VAT exemption and withholding Tax	<ul style="list-style-type: none"> • The client was requested to confirm if there are any 	<ul style="list-style-type: none"> • It was agreed that no any exemption of 15% of VAT but bidder will deducte 5% of the contract

		exemption of Tax and with holding.	amount as with holding tax.
4.0	Availability of the Key personnel as indicated in the Bids.	<ul style="list-style-type: none"> The contractor was requested to confirm if there is any change on the personnel's listed in tender documents and site organization strategies. 	<ul style="list-style-type: none"> The contractor confirmed that resources and personnel are available and ready for works as it was dedicated in the submitted tender documents, Except there will be changes on personnel. The contractor is required to submit the CV of the same to Consultants for vetting, Personnel's should have and equal or above qualification of the personnel's to replace.
5.0	Commencement and completion of the works.	<ul style="list-style-type: none"> Commencement and completion of site works Work Programme 	<ul style="list-style-type: none"> It was agreed that commencement of works at the site shall be after site possession and construction period will be Six (6) months including mobilization period. It was agreed that, after site possession, contractor to adjust the dates of the submitted master programme (to be submitted within one (1) week basing on the date of site possession. The contractor is required to update master programme of works after every ninety (90) days after site possession. Failure to submit an updated master programme of work within agreed time, the contractor will be required to pay Tanzania Shillings Two Million (TZS 2,000,000/=) as a penalty. The contractor is required to prepare a monthly programme of works on each month, and the same to be attached to the progress report.
		<ul style="list-style-type: none"> Test Results 	<ul style="list-style-type: none"> Contractor confirmed that test results will be conducted at Zanzibar Road Department under the

		Ministry of works.	<ul style="list-style-type: none"> • Test Results of some materials to be submitted 14 days after site possession • Contractor informed that sand testing will be submitted depending on pit since authorized pits are keeping on changing. • Contractor confirmed to comply with all required standards and regulations and advice on changes whenever necessary.
	<ul style="list-style-type: none"> • Compliance with national and international standards and regulations • Location of Contractor's base for the works 		<ul style="list-style-type: none"> • The contractor confirmed that they will have the main base at Mtopepo and all materials will be stored and fabricated there. • On site will be only assembling and fixing in order to ensure the security of materials on site and easy quality management.
	<ul style="list-style-type: none"> • Health and Safety 		<ul style="list-style-type: none"> • Contractor confirmed to adhere to Health and Safety regulations to the working environment and workers as a mandatory requirement of the contract.
	<ul style="list-style-type: none"> • Security requirements. 		<ul style="list-style-type: none"> • Bank guarantee for advance payment to be submitted should cover the period equivalent to 80% of the work done when the full amount of the advance payment will have been recovered. • Performance security should be in form of bank guarantee and unconditional cover the stated amount of the contract sum from reputable commercial bank. • The format of Bank Guarantees to be as per required format stated in the tender document

(Signature)

6.0	Payments terms and Condition	<ul style="list-style-type: none"> • Advance payment: Contractor asked 20% of advance payment. • Recovery of advance payment (Reference was made to Special Condition of Contract Sub clause 14.2) 	<ul style="list-style-type: none"> • The client agree to issue 20% of payment as advance payment. The contractor shall provide advance bank guarantee same amount of advance payment and should be unconditionally from reputable commercial bank. • Recovery of advance payment will commence when the total work was done at the site is equivalent to 30% of the total contract price excluding provisional and contingencies as stated in the contract. • The advance payment will be fully recovered when works at the site are at 80% of the total works in the contract. • Means of recovery will be done using a specific formula for advance payment recovery. • The contractor was requested to submit a monthly claim to the Client engineer four (4) working days before forthcoming site meeting. • Consultant confirmed to issue Interim Payment Certificate within seven (7) working days after site meeting. • The contractor was allowed to include projected works that will be completed within four (4) days after submission of the monthly claim. • The client confirmed to issue the payments within 45 days after receiving Interim Payment Certificate from the Client engineer. • The agreed minimum amount to be issued in any Interim Payment Certificate is Two Hundred
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			<p>Million (TZS 200,000,000.00) spent.</p> <ul style="list-style-type: none"> It was agreed that materials on site will not be paid.
		<ul style="list-style-type: none"> Re measurements of works 	<ul style="list-style-type: none"> The contractor was instructed to record all re measurements properly and submits to Client engineer on monthly bases.
		<ul style="list-style-type: none"> Mode of Payment 	<ul style="list-style-type: none"> Mode of payment agreed to be in Tanzania Shilling. Payment will done by advance payment and Interim certificate issued by contractor and approved by client engineer.
7.0	AOB	<ul style="list-style-type: none"> Email Communication 	<ul style="list-style-type: none"> It was agreed that email communication should be noted as official communication when the documents attached has a letter head and is a scanned document of the original document that has to be submitted in hardcopy. It was agreed that materials on site shall be secured by contractor his self. It was agreed that once interim certificate issued the material on site will not included in payment schedule.

BAK

		<ul style="list-style-type: none"> Anticipated Risks 	<ul style="list-style-type: none"> The client pointed out the anticipated risks which might occur during project execution, which is:- <ul style="list-style-type: none"> a) Delay of payments which can be caused by the Client The client confirmed to issue the payments as early as possible after receiving payment certificates Contractor confirmed to execute works at Mtopepo as per programme of works. Contractor confirmed to execute the works to the required standards and deliver to Client quality works.
		<ul style="list-style-type: none"> Team Working Spirit 	<ul style="list-style-type: none"> Emphasize was given to the team working spirit and having quickly responding to the any query submitted by Contractor.
8.0	Closing of the meeting	<ul style="list-style-type: none"> Closing time and general remarks 	<ul style="list-style-type: none"> The meeting proceeding was officially closed at 02:30pm by the Chairman Mr. Ali Kh. Juma after thanking all members who attended the meeting.

Signed by Ali Kh. Juma Date 19.01.2022
 Mr. Ali Kh. Juma
 (MOEVT-Zanzibar)
 Chairman



Signed by Pasag Rahangdale Date 17/01/2022
 Mr. Pasag Rahangdale
 Estim Construction Limited

ESTIM CONSTRUCTION LTD. ZANZIBAR
 P.O. Box 1554
 ZANZIBAR

