PROPOSED BOUNDARY WALL & GATE HOUSE FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO.2782/4 AT SNOWVIEW ESTATE-NANYUKI,LAIKIPIA COUNTY.

TENDER DOCUMENTS

Prepared By

AMAZON CONSULTANTS LIMITED
Quantity Surveyors & Project Managers
P.o. Box 1756-00100
Nairobi.

FEBRUARY 2024

Amazon
Consultants

ACL/P150/7402D/24

20th February 2024

TO ALL TENDERERS

Dear Sir/Madam,

PROPOSED GATE HOUSE & BOUNDARY WALL FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO. 2782/4 AT SNOWVIEW ESTATE- NANYUKI, LAIKIPIA COUNTY.

INVITATION TO TENDER

On behalf of our client, **Nanyuki Snowview Heights Ltd**, we are pleased to invite you to submit a competitive tender for the above works.

The tender documents may be downloaded from https://amazon.co.ke/

The tenderer shall download the tender documents, duly fill and return in **HARDCOPY** to **ATTICSPACE Architects Ltd, Office No. B13 (**0758197996-Zipporah Wangui**)** on **1st Floor, Nanthill Court (RRHF + MCV)** located in **Kiambu Town, not later than 10:00 AM** on **Monday 4th March 2024,** where they shall be opened immediately thereafter.

Bidders are welcome to witness the opening of the Tenders.

All queries and/or clarifications shall be forwarded to info@amazon.co.ke and copied to rukwaro@amazon.co.ke

Yours faithfully,

Steve Rukwaro
For: Amazon Consultants Ltd

Cc: Directors; Nanyuki Snowview Heights Ltd

PROPOSED GATE HOUSE & BOUNDARY WALL FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO. 2782/4 AT SNOWVIEW ESTATE- NANYUKI, LAIKIPIA COUNTY.

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SIGNATURE PAGE

PROPOSED GATE HOUSE & BOUNDARY WALL FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO. 2782/4 AT SNOWVIEW ESTATE- NANYUKI, LAIKIPIA COUNTY.

Supplied as part of the contract for the above works

Issued by;

Amazon Consultants ltd
Quantity Surveyors
P.O. Box 1756-00100,
Nairobi

February 2024

The Contract for the above-mentioned Works, entered into on the

_____ day of _____ 2024

by the undersigned parties refers to these Bills of Quantities which shall be read and Construed as part of the said Contract.

_____ (EMPLOYER)

_____ (CONTRACTOR)

DATE _____2024

DATE _____2024

FORM OF TENDER

TO: NANYUKI SNOWVIEW HEIGHTS LTD
P.O. BOX 1756-00100
NAIROBI.

Messrs,

PROPOSED GATE HOUSE & BOUNDARY WALL FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO. 2782/4 AT SNOWVIEW ESTATE- NANYUKI, LAIKIPIA COUNTY.

a) We _____subject to the conditions of tendering general conditions of contract, drawings and specifications, offer to execute the works at a lump sum of _____ _____ (Kshs_____)

b) We agree to complete the works within _____weeks from the date of possession of the site or within such extended time as provided in the contract conditions.

c) Further we agree that this tender shall remain valid for One Hundred and Twenty (120) days from the date of submission.

d) We further understand that the lowest or any tender may neither be necessarily accepted nor will expenses incurred in the preparation of this tender be allowed.

Signature of Tenderer _____

Name and Stamp _____

Date _____

Witnessed by: _____

Date _____

PROPOSED GATE HOUSE & BOUNDARY WALL FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO. 2782/4 AT SNOWVIEW ESTATE- NANYUKI, LAIKIPIA COUNTY.

SPECIAL NOTES AND CONDITIONS OF TENDERING

1. The Contractor is required to check the numbers of the pages and should any be found to be missing or in duplicate or the figures or writing indistinct, he must inform Qs Steve Rukwaro through info@amazon.co.ke and copy rukwaro@amazon.co.ke at once and have the same rectified. Should the Contractor be in doubt about the precise meaning of any item, word or figure, for any reason whatsoever, or observe any apparent omission of words or figures he must inform the Quantity Surveyor in order that the correct meaning may be decided upon before the date for the submission of the tender.

2. No liability whatsoever will be admitted nor claim allowed in respect of errors in the Contractor's tender due to mistakes in the Bills of Quantities which should have been rectified in the manner described above.

3. The Contractor shall not alter or otherwise qualify the text of these Bills of Quantities. Any alteration or qualification made without authority will be ignored and the text of the Bills of Quantities as printed will be adhered to.

4. The Contractor shall be deemed to have made allowance in his prices generally to cover items of Preliminaries or additions to Prime Cost Sums or other items, if these have not been priced against the respective items.

5. All items of measured work shall be priced in detail and tenders containing lump sums to cover trades or groups of work must be broken down to show prices for each item before they will be accepted. Lump sums to cover items of Preliminaries shall likewise be broken down if so required.

6. In no case will any expenses incurred by Contractors in preparation of this Tender be reimbursed.

7. The copyright of these Bills of Quantities is vested in the Quantity Surveyor and no part thereof may be reproduced without their express permission given in writing.

8. The Contractor is solely responsible for the accurate ordering of materials in accordance with the Drawings and Architect's Instructions and no claims for any loss or expense will be entertained for orders for materials based upon the Bills of Quantities.

9. The Bills of Quantities must be priced and in Kenya currency, i.e. Shillings and cents

10. The bidders are encouraged to visit the site before submission of the bids. No claims will be allowed for travelling or other expenses which may be incurred by the contractor in visiting the site or preparing the tender for the works. The site is located **off road C76 (Nanyuki-Ramuruti Road) at the junction of the road to Mukima Shopping Centre**.

11. **Rates inserted in the bills of quantities shall be deemed to be INCLUSIVE of all taxes including VAT.**

PROPOSED GATE HOUSE & BOUNDARY WALL FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO. 2782/4 AT SNOWVIEW ESTATE-NANYUKI, LAIKIPIA COUNTY.

INVITATION TO TENDER FOR BUILDING WORKS CONTRACTORS.

The Client

The client is Nanyuki Snowview Heights Ltd.

Description of the project

Nanyuki Snowview Heights Ltd is looking for Building Works Contractors interested in construction of a Gate House and Boundary Wall, 1904.43m long. The works for the Gate House include substructure works, reinforced concrete superstructure works, gates and shading deck. The works for the Boundary Wall include excavations, Concrete Works and Boundary wall structure. The site of the proposed works is located off road C76 (Nanyuki-Nyahururu road) at the junction of the road to Mukima shopping centre.

Notes To Bidders

1. The purpose of this document is to assist the client, Nanyuki Snowview Heights Ltd in the evaluation of Contractors who will carry out the works.
2. Bidders will be selected in accordance with the procedures set out by the Client.
3. The client reserves the right to verify the accuracy of the information provided in the bid documents. Bidders may be asked to clarify the information provided after close of the submission deadline.
4. This tender does not amount to any contractual obligation on the part of the client and neither does it oblige them to award any bidder(s) nor give reasons for their decision(s).
5. Bidders will meet all cost associated with preparation and submission of their tender.
6. Bidders are advised to regularly check the website https://amazon.co.ke/ for any updates, amendments or clarifications.
7. All documents must be submitted in English language.

8. Bidders may request for additional information or clarifications from the client through info@amazon.co.ke and copy rukwaro@amazon.co.ke not later than four [4] days before the submission deadline. Any such response or clarification shall be uploaded on the portal for the access of all bidders.
9. The completed tender document shall be submitted following the outlined sequence on or before **1000Hrs** on **4th March 2024** and delivered to the **ATTICSPACE Architects Ltd, Office No. B13** on **1st Floor, Nanthill Court (RRHF + MCV)** located in **Kiambu Town.** The tender documents shall thereafter be opened on **4th March** in the presence of the bidders' designated representatives who choose to attend.
10. Any tender documents received by the client after the deadline shall be declared late and rejected, and promptly returned unopened.
11. Sealing and marking of the tender.
    a. The tender document shall be delivered in a single sealed envelope or package, or in a single sealed container bearing the following details:
        i. The name of the assignment.
        ii. The name and address of the client.
        iii. A warning: 'DO NOT OPEN BEFORE **1000Hrs on Monday 4th March 2024.**

    b. Within the single sealed envelope, package or container referred to above, the bidder shall place the following separate sealed envelopes:
        i. An envelope marked 'TECHNICAL PROPOSAL', containing ONE (1) original and ONE (1) copy of the Technical Proposal.
        ii. An envelope marked 'FINANCIAL PROPOSAL', containing ONE (1) original and ONE (1) copy of the Financial Proposal.

    c. Each envelope in item (b) above shall bear the following details:
        i. The name of the assignment.
        ii. The name and address of the client.
        iii. The name and address of the bidder.

iv. A warning on the Financial Proposal envelope: 'DO NOT OPEN WITH THE TECHNICAL PROPOSAL'

Tender Evaluation Criteria

The tenders shall be evaluated in the following four (4) stages:

Stage A. Preliminary Evaluation;

Evaluation of Mandatory requirements

All requirements MUST be met to proceed to Technical Evaluation.

Stage B. Technical Evaluation

Bidders who score 70 and above shall qualify for financial evaluation.

Stage C. Financial Evaluation

A detailed financial analysis of the bids shall be done at this stage and the lowest 3No. Responsive bidders will proceed to due diligence stage.

Stage D. Due Diligence

Due diligence may be done to seek further clarification/confirmation if necessary.

The lowest most responsive bidders shall be awarded.

Stage A: Preliminary Evaluation

Mandatory Requirements for Civil Works Contractors.

Bidders are required to submit the following mandatory documents/information:

1. Valid copy of Certificate of Incorporation.
2. Valid Tax Compliance Certificate.
3. Valid copy of National Construction Authority (NCA) Registration Certificate for Building and Civil Works and associated services.
4. Valid Annual Contractors Practicing License from NCA.

5. Valid copy of the current Single Business Permit.
6. Valid CR12 form showing the list directors /shareholding (issued within the last 6 Months), a Certificate of Business Name Registration and National Identity Card for Sole Proprietorship.
7. Certified audited accounts for the last two [2] years (2021 & 2022).
8. Letter of authority to seek reference from the bidder's bank (include bank details such as the bank name, branch name and account number(s) and contact(s)).
9. Dully filled, signed and stamped form of tender shall form part of the technical proposal.
10. Interested bidders/applicants shall provide a paginated document with a Table of Contents. The document shall be intact, sequentially serialized and securely sewn and tape bound.

NB: Bidders who do not meet any of the above requirements will be disqualified and shall **not** be evaluated further.

The employer may seek further clarification/confirmation if necessary, to confirm authenticity/compliance of any condition of the tender.

Stage B: Technical Evaluation

Bidders will be required to provide documents/information based on the following technical and general requirements in response to this tender. The award of points for the Technical Evaluation will be as follows: -

Technical and General Requirements for Building Works Contractors.

	Parameter	Maximum Points
1)	Key personnel	20
2)	Completed / Ongoing Projects	20
3)	Schedules of appropriate equipment	12
4)	Evidence of having a registered office/ physical address	8
5)	Evidence of financial resources	8
6)	Evidence of financial strength	12
	Total	**80**

The detailed scoring plan shall be as shown in Table 1.

Table 1: Scores for the Technical Evaluation- Building Works Contractors

Item	Description	Points Scored	Max Points
1	**Director** of the firm with degree/ higher diploma/ certificate in the construction industry. ▪ Curriculum Vitae----------(1 mark) ▪ CERTIFIED qualification certificates----------(1 mark) a) With at least 7 years of experience in the construction industry----------(10 marks) b) With at least 5 years of experience----------(8marks) c) With at least 3 years of experience ----------(6 marks)		12
	Site Agent with a diploma/certificate in a building/construction related field. Attach: ▪ Curriculum Vitae----------(1 mark) ▪ CERTIFIED qualification certificates----------(1 mark) ▪ Letter of Appointment----------(1 mark) a) With at least 10 years' relevant experience---------- (5 marks) b) With at least 5 years' relevant experience ---------- (3 marks) c) With at least 3 years' relevant experience----------(1 mark)		8
			20

2	**Completed or ongoing projects; at least 2 No. projects** (Attach evidence in letters of award or completion certificates, photographs, recommendation letter(s) from client or consultants). At least 1No. Project should be complete Ongoing projects to be over 50% complete. a) Letter of award or completion certificate--------(4 marks each) b) Recommendation letters; 1 No. from Client and 1 No. from any Consultant for each project---------- (4 marks each) c) Photographs ---------- (2 marks each)		20
			20
3	**Schedules of contractor's equipment.** (ATTACH EVIDENCE OF PROOF OF OWNERSHIP OR LEASE AGREEMENT) For each specific equipment required in the construction work being tendered for; a) At least 1No. Truck ---------- 3 Marks b) At least 1No. pickup---------- 3 Marks c) At least 1No. dumper ---------- 2 Marks d) Concrete batching plant ---------- 2 Marks e) Other relevant equipment- state which ones.....2 Marks		12
			12
4	**Evidence of having a registered office/ physical address Locally.** Provide evidence as follows: a) Location- Co-ordinates or street name and address----------(2 marks) b) Tenancy or Lease Agreement or Title Deed(owner occupied) ----------(2 marks) c) Business Permit----------(2 marks)		8

	d) Photographic evidence of the office----------(2 marks)		
			8
5	**Financial report** **Audited financial report (last two [2] years) - (2021&2022).** a) Turn over greater or equal to 1.5 times the cost of the project ---------- (8 Marks) b) Turn over greater or equal to the cost of the project---------- ----------(5 Marks) c) Turn over below the cost of the project ------ (3 Marks)		8
			8
6	**Evidence of financial strength (cash in hand, lines of credit, over draft facility etc.)** a) Has financial strength above 20% of the cost of the project ---------- 12marks b) Has financial strength between 10-20% of the cost of the project---------- 8 marks c) Has financial strength below 10% of the cost of the project ---------- 4 marks		12
			12
	TOTAL		**80**

NB: Any bidder who scores 70% and above in this Technical Evaluation shall be considered for further evaluation.

Stage C: Financial Evaluation

Upon completion of the technical evaluation a detailed financial evaluation shall follow. The financial evaluation shall be evaluated on the following criteria:

a) Determination of Arithmetic errors.

b) Comparison of Rates.

c) Consistency of the Rates.

d) Front loading.

Stage D: Due Diligence

The Client may inspect the premises and undertake due diligence to seek further clarification/confirmation if necessary, to confirm authenticity /compliance of any condition of the tender /qualifications of the tenderer.

Award Criteria:

The lowest most responsive tender shall be awarded.

BIDDING DOCUMENTS

SPECIFICATIONS

SECTION No. I

SPECIFICATIONS

{These specifications shall be read in conjunction with Ministry of Works General Specifications 1976 edition together with any amendments issued thereto

If there is any discrepancy between the Specifications and these Bills of Quantities and the General Specifications, the Project manager shall give direction}

SPECIFICATIONS

GENERAL ITEMS

Materials Generally

A.1 All materials used on the works shall be new and of the qualities and kinds specified herein and equal to approved samples. Deliveries shall be made sufficiently in advance to enable samples to be taken and tested if required. No materials shall be used until approved and all materials which are not approved or which are damaged, contaminated or have deteriorated in any way or do not comply in any way with the requirements of this specification shall be rejected and shall be immediately removed from the site at the Contractor's expense.

A.2 Material for which there is a Kenya Bureau of Standard specification

All materials used in the works for which a Kenya Bureau of Standards Specification has been published shall conform with the latest edition thereof in every way. The Architect reserves the right to demand that the Contractor shall obtain at his own expense a certificate in respect of any materials to state that is in accordance with the Kenya Bureau of Standard specification.

A.3 Materials for which there is no Kenya Bureau of Standards specification

All materials used in the works for which no Kenya Bureau of Standards specification has been published shall conform with the British Standards Specification for such materials. If there are no published standards as specified for any materials, the quality of such materials shall be generally of a standard equal to those for which there is a Kenya Bureau of Standards or British Standard specification.

A.4 Alternatives to proprietary brands

Where materials are specified by their proprietary names or where fittings are specified by catalogue numbers or descriptions, the contractor may offer materials or fittings of alternative manufacture which are of equal or superior quality. Such alternative must be approved before being used in the works and the Contractor shall allow for this, but prior to tendering he may submit to the Architect for approval the names of any suppliers or manufacturers whose

products he intends to use, together with catalogue numbers and descriptions and/or samples but the decision of the Architect shall be final.

A.5 Samples

The Contractor shall furnish for approval with reasonable promptness all samples of materials and workmanship required by the Architect. The Architect shall check and approve such samples for conformance with the design concept of the works and for compliance with the information given in the Contract Documents. The work shall be in accordance with approved samples.

a) All material samples shall be delivered to the Architect's office with all charges in connection therewith paid by the Contractor.

b) Duplicate final approved samples, in addition to any required for the Contractor's use shall be furnished to the Architect, one for office use and one for the site.

c) Samples shall be furnished so as not to delay fabrication, allowing the Architect reasonable time for consideration of the sample submitted.

d) Each sample shall be properly labelled with the name and quality of the material, manufacturers name, name of the project, the Contractor's name and the date of submission and the specification number to which the sample refers.

A.5 Measuring and Testing Equipment

The Contractor shall provide the following equipment for carrying out measuring and control tests on the site and maintain in full working order:

a) Straight edges 2 metres and 4 metres long for testing the accuracy of the finished concrete.

b) A glass graduated cylinder for use in the silt test or organic impurities in the sand.

c) Slumb test apparatus

d) 150mm steel tube moulds with base plates and tamping rod to B.S. 1881.

e) Two 30 metre steel tapes

f) One dumpy or quickest level and staff

g) Micrometer

EXCAVATION AND EARTHWORK

D.1 Site Clearance

Site Clearance shall include the cutting down of all trees, stumps, bushes, vegetation and rubbish, burning the debris arising in approved locations and carting remaining material to a tip provided by the Contractor.

D.2 Grubbing

Grubbing up roots etc. shall include the following and disposal shall be as described under the foregoing clause:

1) Stumps and roots of large trees shall be completely removed

2) Stumps and roots of small trees, bushes or other vegetation shall be completely removed to a depth of at least 600mm below formation.

3) Smaller stumps and roots of vegetation up to 25mm thick shall be completely removed to a depth of 230mm below formation.

4) Fine roots shall be removed to as great depth as is practicable by hand.

Except where the area of grubbing is to be excavated, all resulting holes shall be filled up solid with approved material compacted to the same relative density as the surrounding.

D.3 Nature of the Soil

The Contractor is advised to visit the site and ascertain the nature of the ground to be excavated and he shall price accordingly and no claim will be allowed for want of knowledge in this respect.

Rates for excavation shall include for excavation in soil, earth, black cotton, sandy soil, Murram, tuff, soft rock, boulders or whatever other subsoil is encountered except hard rock as defined below.

D.4 **Hard Rock.**

Any rock or other hard materials encountered in excavating to the required depths which in the opinion of the Architect or Engineer can only be removed by wedges, compressed air or other special plant or explosives shall be paid for as an extra and the price shall include for trimming and leveling. No plasting will be allowed without prior written permission from the Engineer and relevant Government Authority. Material which can be removed by a pick or traxcavator, ripper or similar mechanical plant will not be classed as rock.

D.5 **Foundation Excavations**

a) The foundation trenches and column bases shall be excavated to the widths and depths of the concrete foundations shown on the drawings or to such widths and depths as the Engineer may instruct after examination of the excavations. Quantities of all excavations shall be measured and valued by the Quantity Surveyor and any difference between such measurements and the measurements herein given shall be dealt with as a variation to the Contract.

If however, the Contractor excavates to any greater depths than shown in the drawings or as instructed by the Engineer, then he shall at his own expense fill in such extra depth of excavation with concrete as specified for the foundations to the satisfaction of the Engineer. The Contractor shall not be paid for the cost of any excavation executed deeper or wider than shown on the drawings or instructed by the Engineer nor the cost of back filling such excavation or disposing of surplus.

b) The Contractor shall report to the Engineer when secure bottoms have been obtained to the excavations and are ready to receive the foundation concrete. Any concrete or other work put in before the excavations have been inspected and approved by the Engineer shall, if so directed be removed and new work substituted in accordance with the specification after excavations have been approve, all at the Contractor's expense.

c) The bottom of all foundation trenches and column bases shall be trimmed square and level. The Contractor shall form such steps on bottoms of

foundation trenches as the Engineer may consider necessary in such positions and to such depths as he may direct.

D.6 **Unauthorised Excavations**

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

D.7 **Borrow Pits**

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

D.8 **Surplus Soil Disposal**

Excavated material not required for subsequent refilling shall be removed to areas off sir which shall be approved by the Architect.

D.9 **Top Soil for Spreading**

Where required in the Bills of Quantities, top soil required for subsequent spreading over finished work shall be especially selected and shall be dumped in special heaps as indicated by the Architect. Such top soil shall be reasonably free from vegetation to the satisfaction of the Architect and shall be compacted as little as possible in the heaps.

D.10 **Filling under Surface Beds in Buildings**

i) **Murram filling**

Murram for filling as base course shall be from an approved source and of the highest quality. It shall be laid in layers not less than 150mm thick and not greater than 230mm thick prior to compaction. Water will be applied to O.M.O. and each layer will be thoroughly compacted by at least 8 passes of a 10 tonne smooth wheeled roller or a 2 tonne vibrating roller until all movement ceases and 100% C.B.R. is obtained.

ii) **Hardcore filling**

Hardcore filling shall be crushed rock, broken brick, broken concrete or other approved hard granular materials broken to pass not greater than a 150mm ring or to be 75% of the finished thickness of the layers being compacted whichever is the less and graded so that it can be easily and thoroughly compacted by rolling. The filling is to be laid in layers each of a consolidated thickness not exceeding 230mm.

Where rolling by 10 tonne smooth wheeled roller or 2 tonne violating roller is impossible, compaction shall be by hand or mechanical tampers. Each layer shall be compacted by at least 8 passes of the roller.

The top surface of the hardcore shall be leveled or graded to falls as required and blinded with similar material broken to 25mm gauge and surfaced with stone dust and well wetted before consolidation by the roller. The surface so obtained shall be to the Engineer's approval.

D.11 **Filling obtained from the Excavations**

Filling obtained from surplus excavated materials is to be free from all weeds, roots, vegetable soil or other unstable materials and is to be filled in lavers each of not more than 230mm finished thickness. Each layer to be well wetted and consolidated as described herein.

D.12 **Anti-termite treatment**

Where described the top surface of filling shall be treated with Gladiator T C Pesticides to be spoiled by Rentokil Ltd. P.O. Box 44360, Nairobi or other equal and approved firm strictly in accordance with the satisfaction of the Architect. The Contractor must destroy any termite nests found within the perimeter of the building and within 20 metres from the building externally and take out and destroy queens, impregnate holes and tunnels with approved insecticide and backfill with hard material, well rammed and consolidated.

D.13 **Polythene Sheeting**

Polythene sheeting shall be produced by an approved manufactuer. Joints in sheeting shall be treble folded with a 150mm fold and taped at 300mm intervals with 50mm wide back plastic adhesive tapes. The sheeting shall not stretched but shall be laid with sufficient wrinkles to permit shrinkage up to 15%.

The Contractor shall ensure that the membrane is not pierced buying laying and concreting.

D.14 Cutting Down Trees

The Contractor must consult the Architect before cutting down or pruning any trees or shrubs encountered on the site. The Contractor shall be held responsible for any damage caused by the building operations to those shrubs or trees not so directed.

D.15 Existing Services

Before commencing works, the Contractor shall at his own expense ascertain in writing from the relevant Local Authorities and all other Public bodies, companies and persons who may be affected, the position and depths of their respective ducts, cables, mains or pipes and appurtenance. He shall thereupon search for and locate such services.

Active existing services shall be adequately protected from damage or relocated as directed by the Architect. Inactive services shall be removed or sealed off in accordance with the direction of the Architect.

D.16 Protection

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

D.17 Removal of Obstruction

In the event of any derelict foundations, walls, slabs, cabs etc, being discovered upon the site of the works, they shall, if below new foundations be completely removed to a level of 150mm below the level of the new foundations as instructed by the Architect. For graded or planted areas, any such obstructions shall be removed to a depth of 600mm below the finished grade.

CONCRETE WORK

LIST OF CLAUSES

CONCRETEWORK

F.1 Codes of Practice

All workmanship, materials, tests and performances in connection with reinforced concrete shall be in conformity with the latest edition of the British Standard for concrete works 9B.S. B110 parts1 &2, B.S. 8004, B.S. 8007) and any other approved Local and International Standards. Where inconsistency exists between these preambles and these Standards, the Contractor shall notify

the Engineer in good time for his Clarification as to which of the two implications on the Contract.

F.2 Supervision

A competent person approved by the Engineer shall be employed by the Contractor whose duty will be to supervise all stages in the preparation and placing of the concrete. All cubes shall be made and site tests carried out under his direct supervision on Consultation with the Engineer.

F.3 Contractor's plant, Equipment and Construction Procedures

Not less than 30 days prior to the installation of the Contractor's plant and equipment for processing, handling, transportation, storing and placing concrete, the Contractor shall submit drawings for approval by the Engineer, showing proposed general plant arrangement, together with a general description of the equipment he proposes to use.

After completion of installation, the operation of the plant and equipment shall be subject to the approval of the Engineer.

Where these Preambles, the Bills of Quantities or the Drawings require specific procedures to be followed. Such requirements are not to be construed as prohibiting use by the Contractor of alternative procedures providing these have been approved by the Engineer in advance.

Approval of plant and equipment or their operation or of any construction procedure shall not operate to waive or modify any provision or requirements contained in the Preambles governing the quality of the materials of the finished work.

F.4 Levels and Foundations

The foundations of the Works shall be carried down to depths as may be directed by the Engineer and they must be cut as nearly to the size of the concrete as possible and the vacant spaces between the concrete and the solid ground

excepting where otherwise shown must be carefully filled in as directed by the Engineer.

All temporary timber shall be removed but should any timber be left in or should any other work be done beyond that specified, it will be at the Contractor's own cost.

F.5 Tolerances

On all setting out, dimensions of 6 mm and over, a maximum non-accumulative tolerance of plus or minus 6mm will be allowed. On all setting out, dimensions under 6mm a maximum non-accumulative tolerance of plus or minus 3 mm will be allowed. On the cross sectional dimensions of structural members, unless otherwise required by the Drawings, a maximum tolerance of plus or minus 3mm will be permitted.

The top surface of concrete floor slabs and beams shall be within 6mm of the normal level and line shown on the Drawings. Columns shall be storey and not more than h/3000 cut of plumb in their full height will be permitted. The Contractor shall be responsible for the cost of all corrective measures required by the Engineer to rectify work which is not constructed within the tolerances set out above.

F.6 Materials Generally

All materials which have been damaged, contaminated or have deteriorated or do not comply in any way with the requirements of these Preambles shall be rejected and shall be removed immediately from the Site at the Contractor's own expense. No materials shall be stored or stacked on suspended floors without the Engineer's prior approval.

F.7 Samples and Testing

The Contractor shall provide on the site, equipment, staff and labour for carrying out the sampling and testing and shall carry out any or all of these tests at such times and with such frequency as may be requested by the Engineer.

All equipment shall be calibrated and checked from time to time by the relevant Government Authority and/or as the Engineer may direct.

The Contractor shall provide all samples required by the Engineer as soon as possible after the contract is let. No deliveries in bulk shall be made until the samples are approved by the Engineer. All condemned materials shall be removed from the site within 24 hours.

Frequency of tests and number of samples required shall be governed by the results of previous tests, the quality of materials revealed during the tests and the uniformity of that quality. Should it become evident that the quality of concrete is deteriorating, the Engineer may require additional samples to be taken and test cubes to be made and tested to determine the cause.

F.8 Cement

Cement unless otherwise specified shall be ordinary Portland Cement of a brand and source approved by the Engineer and shall comply with the requirements of K.S.02-21. A manufacturer's certificate of test in accordance with K.S.02-21 shall be supplied for each consignment delivered to the Site.

Should the Contractor require to use cement of Rapid Hardening variety, he shall submit his proposals to the Engineer along with any cost implications on the project for his approval. Any additional cost that may be caused by the use of Rapid Hardening cement shall be borne by the Contractor.

Cement may be delivered to the Site either in bags or in bulk.

If delivered in bags each bag shall be properly sealed and marked with the manufacturer's name and on the site is to be stored in weatherproof shed of adequate dimensions with a raised floor. Each consignment shall be kept separate and marked so that it may be used in the sequence in which it is received. Any bag found to contain cement which has set or partly set shall be completely discarded and not used in the works. Bags shall not be stored in stacks more than 2.0 metres in height.

No cement which has been kept on site in bags for more than 3 months shall be used in the works.

If delivered in bulk the cement shall be stored in a weatherproof silo either provided by the cement supplier or by the Contractor but in either case the silo shall be to the approval of the Engineer.

F.9 Aggregate

Aggregates shall conform with the requirement K.S.02-95 and all the proposed sources, types and grading test results of all aggregates are to be approved in all respects by the Engineer before work commences.

The grading of aggregates shall be one within the limits set out in K.S.02-95 and as later specified and the grading, once approved shall be adhered to throughout the works and not varied without the approval of the Engineer. Fine aggregates shall be clean, coarse, siliceous sand of good, sharp, hard quality and shall be free from lumps of stone, earth, loam dust, salt, organic matter and any other deleterious substances.

Coarse aggregate shall be good, hard, clean, approved blackstrap or similar stone, free from dust, decomposed stone, clay, either matter, foreign substances or friable thin elongated or laminated pieces. It shall be graded within the limits of K.S.02-95 for is respective nominal size.

If in the opinion of the Engineer the aggregate meets with the above requirements out is dirty or adulterated in any manner it shall be screened and/or washed with clean water at the Contractor's expense.

Aggregate shall be delivered to the Site in their prescribed sizes or gradings and shall be stock-piled on paved areas to boarded platforms in separate units to avoid intermixing. **On no account shall premixed cores aggregates be brought to the patching plant. On no account shall aggregates be stock-piled on the ground**.

The Engineer shall be entitled to require a Certificate from an approved testing laboratory in connection with each source of fine and coarse aggregates

including sand) showing that materials comply with the specification. Samples shall be subjected to such tests and at frequencies as determined by the Engineer. All such testing shall be carried out at the Contractor's expenses.

F.10 Water

The water used for mixing concrete shall be from an approved source, clean, fresh and free from harmful matter and comply with the requirements of B.S.3148.

F.11 Admixtures

Before approval for the use of a proprietor admixture is given, the Contractor shall satisfy the Engineer as to its suitability for the work and its compatibility with the cement it is intended to complement.

F.12 Expansion Joint Fillers

Expansion joint filler shall be "Flexcell" as manufactured by Expedite Ltd. Or "Rexilex" as manufactured by Evomastic Ltd., or equivalent and approved filler.

F.13 Joint Sealant

Sealant shall be plysulphide based "Pli-astic" or "Seelastic" as described, both manufactured by Expandite Ltd., or equivalent, applied in accordance with the manufacturer's printed instructions and prices shall include for temporary battens or fillets and afterwards withdrawing to form groves as necessary.

"Seelastic" shall be applied by gun and where more than 12mm deep shall include filling with loose packing yarn to within 12mm from outer face.

"Pli-astic" shall be applied hot. With the Engineer's approval Polemastic fillers of the appropriate grade as manufactured by Evomastics Ltd. May be substituted for "Seelastic".

On no account shall soft board materials be used as Joint fillers.

F.14 Concrete mixes

All structural concrete shall consist of laboratory designed mixes. The weights of cement, fine, coarse aggregates and water (and plasticiser where required) to be used in the designed concrete mixes shall be those giving one cubic metre of mixed concrete. Each design mix (for each class of structural concrete) shall be submitted to the Engineer along with at least 8 laboratory test results (4 No. 7 days and 4 No. 28 days) for his approval. The design mixes and the accompanying test results shall be sent to the Contractor. No photocopies shall be accepted. once approved these design mixes shall be used in preliminary stage of works.

Only the 28 day results shall from the basis of assessment for the preliminary and works cube results out the Engineer may use the 7 days test results to determine the quality of concreting at his discretion.

F.15 Structural Concrete Strengths at Preliminary Works Stage

For the purpose of this Contract, Structural concrete shall mean concrete for which the specified characteristic cube strength is equal to or higher than 20N/mm.

The concrete mix shall be designed to attain a mean strength greater than the characteristic strength of at least the current margin. The current margin shall be taken as the smaller of the value resulting from (1) or (2) below.

1) For at least 40 separate batches of concrete of identical proportions of similar materials produced over a period of between 5 days and 60 days using the same plant under similar supervision and procedures.

   Current Margin = 1.64 times the standard deviation
   but no less than 7.5N/mm

2) For cube tests on at least 100 batches as described in (1) produced over a period not exceeding 12 months.

Current Margin = 1.64 times the standard deviation but not less than 3.75N/mm for concrete grade 20 and above.

Where there is insufficient data to satisfy (1) and (2), the current margin for the initial mix design shall be taken as 10N/MM until sufficient data is available.

Testing of concrete at preliminary stage shall continue until the Engineer is fully satisfied that the concrete mix has met all the requirements outlines in this section.

The strength at 7 days shall only be indicative and unless the Engineer otherwise agrees, it shall not form the basis of approval for design mixes.

F.16 Quality Control at Works Stage

Once the concrete mix is accepted from preliminary to works stage, the principal basis of control shall be analysis of the cube test results at 28 days.

Cube test results shall be examined individually in 10 consecutive sets of four. The standard deviation and mean strength of each set small be calculated.

The concrete mix proportions shall only be acceptable if all of the following requirements are complied with:

i) Not more than two results in 40 are less than the characteristic crushing strength.

ii) No value of the average for any set of four results shall be less than the characteristic strength plus one-half of the current margin.

iii) When 40 No. have been obtained and the mean strength and standard deviation are calculated, the mean strength minus 1.64 times the standard deviation shall be greater than the characteristic strength.

Where the results do not conform to the above requirements, the following action shall be taken:

- Adjustments to the mix to obtain strength required

- In the case where any result is less than 85% of the characteristic strength the structural implications shall be determined and any necessary implications shall be determined and any necessary remedial action carried out shall be at the Contractor's costs.

F.17 Proportions of Concrete Works

All Structural concrete shall be proportioned in weight using weigh batching machines of an approved type to B.S. 13050 and shall be properly maintained and checked for accuracy to the requirements of Factories Inspectorate and at such intervals as required by the law and or as Engineer shall direct.

F.18 Cement

The Quantity of cement shall be measured by weight. Where delivered in bags, each batch of concrete is to contain one or more bags of cement in accordance with the proportions specified.

For non-structural concrete, volume batching may be used as indicated below:

Class of Concrete	15	10
Nominal mix by volume	1:3:6	1:4:8
Cubic metres of fine aggregate Per 50 kg. bag of cement	0.12	0.16
Cubic metres of coarse aggregate Per 50kg bag of cement	0.24	0.32
Max. size of coarse aggregate	40mm*	40mm*

*or 20mm for blinding concrete where described.

Where batching is by volume, approved gauge boxes of such a size as will give the correct proportions shall be used, and full account shall be taken of bulking due to high moisture content.

F.19 Ready-mixed concrete

Where the Contractor desires to use ready-mixed concrete prepared outside the site, he shall submit a written request to the Engineer for his approval. In his request, the Contractor shall attach a detailed proposal showing the logistics of carrying out such an exercise.

The Engineer shall give his written consent only after satisfying himself with the adequacy of the Contractor's proposals as far as specifications and logistics are concerned. The Engineer may demand particular conditions be fulfilled before granting the permission (A sample of "Delivery Ticket" for ready-mix concrete as attached at the back of this specification.

F.20 Waterproof Concrete

Where waterproof concrete is specified, Seallocrete "Sealopruf Integral Waterproofing Compound" and "Sealocrete Concrete Plasticizer" or similar approved are to be added to the mixing water strictly in accordance with the manufacturer's instructions and at the rate of 500cc and 125cc respectively to each 50kg bag of cement to which the aggregates have already been added and mixed. Not more than 22.5 to 24.75 litres of water per 50kg bag of cement are to be used unless otherwise approved on the Engineer.

F.21 Surface Treatment for Waterproof

Where specified treatment with "Vandex", "Sealocrete Supercoat Waterproofer" etc shall be applied to concrete or blockwork surfaces strictly in accordance with the manufacturer's instructions. The surfaces must be well wire-brushed to remove dirt, efflorescence, adhering mortar and all foreign matter. It shall then be cleaned with fresh water. When absolutely dry a generous coat of Sealocrete Supercoat shall be applied by brush or spray gun. Surface so treated shall be protected from damage or staining as described elsewhere.

F.22 Physical Barrier for Waterproofing

Where specified, physical barriers shall consist of the following:

Mastic Asphalt

This shall be laid in layers of maximum thickness of 10mm each. The materials and workmanship shall comply to CP 102:1973.

Rubber-Membrane

This shall consist of performed laminated membrane comprising an elastomeric self-adhesive rubber/bitumen compound and robust polythene sheet such as Bituthene 1000, as produced by SERVICISED LIMITED or other similar approved material. The membrane shall be stored, handled and laid onto the elements to be protected strictly in accordance with the manufacturers specifications and under the supervision of one of their approved representatives all to CO 102:1973.

Waterbars

Only approved water bars shall be incorporated in the structural concrete works and these shall be provided in the positions indicated on the drawings or at other alternative positions approved by the Engineer.

Joints shall be heat welded in accordance with the manufacturer's instructions and where the waterbar is to be fixed vertically, metal clips as manufactured by the supplier of the waterbar or of other approved design shall be provided to suspend the warerbar from the reinforcement.

Where waterproof concrete is used the Contractor shall adhere strictly to the position and type of construction joints as detailed on the drawings. Any deviation from this procedure or the provision of additional construction joints will require the prior approval of the Engineer and any additional waterbar so required will be at the Contractor's expense.

Formwork shall be designed with sufficient timber forms and blockwiring pieces to support the waterbar and to ensure that it is not displaced during concreting. In the case of horizontal joints in vertical walling and similar members the formwork shall be so constructed as to permit the starter or upstand concrete surrounding the lower half of the waterbar to be poured in the same operation as the slab or other concrete from which it springs. Formwork to walls or similar members where waterbar is positioned at the base of the lift shall have sufficient inspection openings not less than 300mm square at approximately 15mm to 300mm above the level of the waterbar to permit checking that the waterbar is correctly positioned and not displaced during concreting.

Through-bolts or ties will not be permitted in liquid retaining structure or in retaining walls. The Contractor shall use only such bolts or ties as are capable of being removed in part so that the portion remaining embedded in the concrete shall be between the specified thickness of cover to the reinforcement.

No concreting will be permitted to portions where upstand starters form an integral part until the formwork to the starter has been fixed and approved. No through holes shall be permitted in basement retaining walls.

The Contractor shall provide the following furniture and equipment for setting u his laboratory to be used in carrying out control tests on the site.

F.23 Work Cube Tests

Work cubes are to be made at intervals as required by the Engineer and the Contractor shall provide a continuous record of the concrete work. The cubes shall be in approved 100 or 150 mm moulds as required by the Engineer ins trict accordance with the Code of Practice.

At least four cubes shall be made on each occasion, from different batches, the concrete being taken from the point of deposit.

Frequency of the tests and the number of samples required will be governed by the results of the previous tests, the quality of the materials revealed during the tests and the uniformity of the quality. Should it become evident that the quality

of the concrete is deteriorating the Engineer may require additional samples to be taken and test cubes to be made and tested to determine the cause.

Each cube shall be marked with a distinguishing number (numbers to run consecutively and the date and a record shall be kept on site giving the following particulars:

a) Cube No.

b) Date and time made

c) Temperature and weather conditions

d) Location in work

e) 7-day Test

Date: ……..

Strength ……..

f) 28-day Test

Date: ……

Strength ……..

Cubes shall be forwarded, carriage paid to an approved Testing Laboratory in time to be treated two at 7 days and two at 28 days. No cube shall be dispatched within 3 days of casting.

Authentic copies of all work Test results shall be forwarded to the Engineer directly from the testing laboratory and one shall be retained on the site. The test certificate shall indicate all properties as required by B.S. 1881.

If the strength required above are not attained and maintained throughout the carrying out of the Contract, the Contractor will be required to increase the

proportion of cement and/or substitute better aggregates so as to give concrete which does comply with the requirements of the contract. 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 work Cube Test.

The Contractor must allow in his rates for concrete test cubes for all expenses in connection with the preparation and conveyance to the Testing Laboratory and testing of test cubes and no claim in respect of his failure to do so will be entertained.

F.24 Mixing of Concrete

The concrete shall be mixed only in approved driven weigh batch mixers of a type and capacity suitable for the work. The batching plant shall have a reserve capacity of at least 30% over and above the expected maximum demand.

The weigh batch mixer shall be equipped with an accurate water measuring device. All materials shall be thoroughly mixed or before the water is added and the mixing of each batch shall continue for a period of not less than two minutes after the water has been added and until there is a uniform distribution of the materials and the mass is uniform in colour.

The entire contents of the mixed drum shall be discharged before recharging. The volume of mixed materials shall not exceed the rated capacity of the mixer. Whenever the mixer is started, an extra cement shall be added to the fined catch and no extra payment shall be made on this account.

As a check on concrete consistency, slump tests shall be carried out in accordance with B.S. 1881. The Contractor shall provide the necessary apparatus and allow for the cost of such test.

The slumb of the concrete made with the specified water content, using any materials shall be determined and the water to be added under wet conditions shall be so reduced as to give approximately the same slumb.

F.25 Transport Concrete

The concrete shall be mixed as near o the place where it is required as is practicable and only as much as is required for a specified section of the work shall be mixed at one time. Such section to be commenced and finished in one operation without delay.

All concrete must be efficiently handled and used in the works within twenty (20) minutes of mixing. It shall be discharged from the mixer direct either into receptacles or barrows and shall be distributed by means which do not case separation or otherwise impair the quality of the concrete. Approved mechanical means of handling will be encouraged but the use of chutes for placing concrete is subject to the prior approval of the Engineer.

Where approval is obtained for concrete to be conveyed by chutes, these shall have a slope (not exceeding 1 vertical to 2 horizontal) such as to ensure a continuous flow of concrete. Additional water shall be introduced to assist the flow.

Where approval is obtained for pumping the concrete, the pump manufacturer's recommendations shall be followed. The pumps used shall be of adequate capacity and power to ensure delivery of a continuous supply. The Contractor shall provide adequate alternative arrangements for transporting concrete including standby pumps in case of breakdown of the pumping equipment.

No relaxation of these specification on pumped concrete will be permitted. In particular, attention shall be paid to the proper grading of aggregate to prevent bleeding and or aggregation during pumping operations.

The inclusion of mixtures to improve the flow characteristics or the concrete will only be permitted where it can be shown that they do not adversely affect the concrete.

Proper bridging arrangements for traffic over reinforcement shall be provided so that the reinforcement is not distorted, damaged or displaced.

F.26 Placing Concrete

No concrete shall be placed before approval by the Engineer's representative.

Any accumulation of set concrete on the reinforcement shall be removed by wire brushing before further concrete is placed.

Care shall be taken that the concrete is not disturbed or subjected to vibrations and shocks during the setting period.

Mixing machines, platforms and barrows shall be clean before commencing mixing and be cleaned on every cessation of the work.

Where concrete is laid on hardcore or other absorbent materials, the base shall be suitable and sufficiently wetted before the concrete is deposited.

Concrete shall be placed from a height not exceeding 1.5m directly into its permanent position and shall not be worked along the shutters to that position. Unless otherwise approved, concrete shall be placed in a single operation to the full thickness of slabs, beams and similar members and shall be placed in horizontal layers not exceeding 1.5m deep in walls and similar members.

Concrete in columns may be placed to a height of 4.0m with careful placing and vibration and satisfactory results. Where the height of the column exceeds 4.0m suitable openings must be left in the shutters so that this maximum lift is not exceeded. The bottom 500mm must first be thoroughly compacted before more concrete is added as the vibrator is gradually withdrawn.

Tops of lifts in walls and columns shall be finished level and well compacted so that minimal preparation of the next lift is required.

Concrete shall be placed continuously until completion of the part of the work between construction joints as specified hereinafter.

If stopping of concreting is unavoidable elsewhere, a construction joint shall be made where the work is stopped. A record of all such joints must be made by the contractor and a copy supplied to the Engineer.

F.27 **Wet Weather Concreting**

Concreting during periods of constant rain shall not be permitted unless aggregate stockpiles, mixers and transporting equipment and the areas to be concreted are adequately covered.

F.28 Hot Weather Concreting

Concreting shall not be permitted if its temperature at placing is in excess of 38c. In order to maintain the temperature of the concrete below this value the following precautions shall be taken wholly or in part as instructed by the Engineer:

i) All aggregate stockpiles, water lines and tanks as well as the mixer shall be protected from the direct rays of the sun.

ii) Coarse water shall be cooled by constant watering where possible

iii) Mixing water shall be cooled by the addition of ice to the storage tanks where necessary.

iv) Rapid-hardening cement shall not be used

v) Where the above precautions are inadequate, concreting shall be carried out during the cooler parts of the day or night as may be directed by the Engineer.

When the air temperature is above 20c loss of mixing water by evaporation shall be considered in arriving at the amount of water to be added to the mix. In order to maintain the water/cement ratio within permissible limits, an approved water-reducing agent shall be included in the mix.

The maximum water/cement ratio may be increased with the Engineer's permission during mixing, but on no account shall water be added to concrete directly or indirectly once it has left the mixer.

In order to reduce premature drying of the concrete during transporting and placing, all chutes, formwork and reinforcement shall be cooled by watering when possible, or shall otherwise be protected from the direct rays of the sun.

Any water so used shall be removed by jetting with compressed air before placing the concrete in close contact.

As soon as possible after concreting, the formwork shall be stripped and the surface of the concrete shall be treated in accordance with the requirements stated elsewhere.

Where drying winds are encountered, wing shields shall be positioned as directed by the Engineer to protect exposed surfaces of the curing concrete.

F.29 Continuous Pour in Concrete

Where the Contractor desires to use continuous concreting method in large sections (rafts and walls), he shall submit a written request to the Engineer for approval. In the request he shall attach details which shall include but not be limited to the following:

- Total amount of concrete to be placed in the shift

- Stock of approved concrete materials on site

- Capacity of the batching plant

- Number and type of truck mixers to be deployed for the exercise and movement logistics

- Number and capacity of plant to be used in placing concrete
  (bumps, vibrators, buckets, etc)

- Method(s) of monitor and dealing with the heat of hydration

- Details of protection against rain and floodwaters and now to cope with it.

The Engineer shall consider the above details and other parameters (e.g. weather, satisfactory records of cube test results, availability of adequate working section where reinforcement placement and the necessary formwork have been approved etc) before making his decision. The Engineer may order

that additional concrete cube moulds be made available as well as arrangements be made for cube crushing with an approved laboratory to cope with the increased demand.

The Engineer may order that the concreting works be stopped immediately if in his opinion the quality of the works is threatened for whatever reason.

F.30 Special No-fines Concrete

No-fines concrete for use in subsoil drainage shall consist of a 1:8 cement/aggregates mix by volume. Aggregate shall be 20mm to 10mm graded with no more than 5% passing the 10mm sieve. Only sufficient water shall be added to ensure complete coating of the aggregate. One half of this water shall be placed into the mixer first, after which the aggregate and cement shall be admitted. After partial mixing, the balance of the water shall be added until a consistency of mix is achieved.

Preliminary tests shall be carried out on the site to prove the suitability of the finished concrete and adjustments made to the proportions and/or grading as may be required by the Engineer.

Compaction

At all times during which concrete is being place, the Contractor shall provide adequate and experienced labour to ensure that the concrete is compacted in the forms to the satisfaction of the Engineer.

The Contractor shall ensure that he has at least 0% backup/reserve capacity over and above the maximum executed demand.

Concrete shall not be placed at a rate greater than will permit satisfactory compaction not to a depth greater than 450mm before it is compacted.

During and immediately after placing, the concrete shall be thoroughly compacted by means of continuous vibration.

Care shall be taken to fill every part of the forms to work the concrete under and around the reinforcement without displacing it and to avoid disturbing recently placed concrete which has begun to set.

Any water accumulating on the surface of newly placed concrete shall be removed and no further concrete shall be placed thereon until such water is removed. Internal vibrators shall have a frequency of not less than 7,000 cycles per minute and shall have a rotation eccentric weight of at least 0.75 kg with an eccentricity of not more than 15mm. Such vibrators shall visibly affect the concrete within a radius of 250mm from the vibrator.

Internal vibrators shall not be inserted between layers of reinforcement less than one and one half times the diameter of the vibrators apart. Contact between vibrators and reinforcement and vibrators and formwork shall be avoided.

Internal vibrators shall be inserted vertically into the concrete wherever possible at not more than 500 mm centres and shall constantly be moved from place to place. No internal vibrator shall be permitted to remain in any one position for more than ten seconds and it shall be withdrawn very slowly from the concrete.

In consolidating each layer of concrete the violating head shall be allowed to penetrate and re-vibrate the concrete in the upper portion of the underlying layer. In the area where newly placed concrete in each layer joins previously placed concrete, more than usual vibration shall be performed, the vibrator penetrating deeply at close intervals along these contacts. Layers of concrete shall not be placed until layers previously placed have been vibrated thoroughly as specified.

Vibrators shall not be used to move concrete from place to place in the formwork.

At least one internal vibrator shall be operated to every four cubic metres of concrete placed per hour and at least one spare vibrator for every three shall be maintained on site in case of break-down during concreting operations.

External formwork vibrators shall be of the high frequency low amplitude type applied with the principal direction of vibration in the horizontal plane. They shall be attached directly to the forms at not more than 1.200m centres.

In addition to internal and external vibration, the upper surface of suspended floor slabs shall be leveled with a tamping or vibrating screed prior to finishing.

Vibrating elements shall be of the low frequency high amplitude type operating at a speed of not less than 3,000 n.p.m.

F.32 Construction Joints

Construction joints shall be permitted only at the positions predetermined on the drawings or as instructed on the site by the Engineer. In general they shall be located at points of minimum speer, viz, vertical at, or near micspans of slabs, ribs and deems.

The position of construction joints, when not shown on the Drawings or otherwise required by this specification, small be decided on site having regard to the plant and labour made available by the Contractor for the manufacture, placing and compaction of the concrete as well as its curing, the climatic conditions prevailing at the time of concreting, the nature and size of the formwork and conditions of operations of the work. The Contractor shall submit his proposals to the Engineer for his approval before commencing the work.

Suspended concrete slabs are generally to be cast using alternative bay construction in bays not exceeding 15m in length. No to adjacent bays are to be cast within a minimum period of 48 hours of each other. The joints between adjacent bays are to be in positions agreed with the Engineer.

Under no circumstances shall concrete be allowed to tail-off, but it shall be deposited against stopping-off boards.

Before placing new concrete against concrete hardened, the face of the old concrete shall be thoroughly hacked, roughened and cleaned, and laitance and loose material removed therefrom, and immediately before placing the new concrete the surface shall be saturated with water and covered with a coat of mortar at lest 25mm in thickness composed of cement and fine aggregate in proportions used in the concrete.

F.33 Curing and Protection

Care must be taken that no concrete is allowed to become prematurely dry and the fresh concrete must be carefully protected within two hours of placing from rain, sun and wind by means of at least three layers of Hessian sacking, white polythene sheeting or other approved means. This protective layer and the concrete itself must be kept continuously wet for at least seven days after the concrete has been placed. The Contractor must allow for the complete coverage of all fresh concrete for a period of 7 days. Hessian or white polythene sheeting shall be in the maximum widths obtainable and shall be secured against wind. The Contractor will not be permitted to use old cement bags, clear or any other colour polythene sheets, hessian or other material in small places.

Concrete in foundations and other underground work shall be protected from admixture with the falling earth after placing.

Traffic or loading must not be allowed on the concrete until the concrete is sufficiently matured and in no case shall traffic or loading be of such magnitude as to cause deflection or other movement in the formwork or damage to the concrete members. Where directed by the Engineer props may be required to be left in position under slabs and other members for greater periods than those specified hereafter.

F.34 Faulty Concrete

Any concrete which fails to comply with these Preambles, or which shows signs or setting before it is placed small be taken out and removed from the bite, where concrete is round to be defective after it has set the concrete shall be cut out and replaced in accordance with the Engineer's instructions. On no account shall any faulty, honeycombed, or otherwise defective concrete be repaired or patched until the Engineer has made an inspection and issued instructions for the repair.

On the Engineer's instruction, the contractor shall cut out and replace any concrete in any part of the structure if in the Engineer's opinion:-

a) The concrete does not conform to the specification, or

b) Deleterious materials or materials which are likely to produce harmful effects have been included in the concrete.

c) The honeycombed or damaged surfaces are too extensive, or

d) The finished concrete sizes are not in accordance with the drawings within permissible tolerance, or

e) The setting-out is incorrect, or

f) The steel cover has not been maintained, or

g) The protection, including curing of the concrete during the construction was inadequate resulting in damage, or

h) Undue deformation of or damage to the works has taken place due to inadequate shutterings or to premature traffic or to excessive loading, or

i) Any combination or the above points has taken place resulting in unsatisfactory work.

The whole of the cost, whatsoever (including time lost) which may be occasioned by the need to remove faulty concrete shall be borne by the Contractor.

F.35 Loading Tests

The Engineer may direct that a loading test be made on the works or any part thereof if he deems such a test to be necessary for one or more of the following reasons:

a) Failure of “Site cubes” to attain the strength requirements

b) Premature removal of formwork

c) Overloading of structure during construction

d) Improper compaction of concrete

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 structure being of less than the required strength.

The loading test ordered solely or in part for reasons (a) to (e) shall be made at the Contractor's own cost.

Loading tests shall be carried out in accordance with the requirements of B.S. 8110.

If the results of the test are not satisfactory, the Engineer will direct that the part of the work concerned be taken down or removed and reconstructed to comply with the Specification or that such other remedial measures as he may think fit be taken to make the work acceptable and the Contractor shall carry out such work at his own cost.

The Engineer may also instruct the Contractor before a loading test takes place to take out cylindrical core specimens from the structures concerned and have them tested. The cutting equipment and the method of doing the work shall be to the Engineer's approval. The specimens shall be dealt with in accordance with BS 1881. Prior to testing, the specimens shall be available for examination by the Engineer. If the cores are ordered to be taken solely or in part for reasons (a) to (e) above, the work involved solely or in part for reasons (a) to (e) above, the work involved and the testing shall be made at the Contractor's own cost.

No extensions of time shall be granted for any delays or disruption of work caused by these test.

F.30 **Steel reinforcement**

The steel reinforcement shall comply with the latest requirements of the following British Standards:

Hot rolled MS for the

Reinforcement of concrete KS 02-22

Hot rolled MS for the
Reinforcement of concrete KS 4449

Cold worked H.Y. steel for the
Reinforcement of concrete BS 4461

Hard drawn steel wire BS 4482

Generally high yield, hi-rib reburies (425 & 460N/mm) shall be used for main reinforcement and mild steel round bars. (250 N/mm) for links and ductility for special elements where specified. In addition where so detailed, mild steel deformed bars shall also be used.

The Contractor shall submit a test certificate of the rolfings. Reinforcement shall be stored on racks above ground level in covered waterproof sheds to keep away rain water. The sheds shall be well drained to prevent deterioration or contamination from any cause. All reinforcement shall be free from loose mill scale or rust, grease, paint or other substances likely to reduce the bond between the steel and concrete.

F.37 Fabric Reinforcement

Fabric reinforcement shall be electrically cross-welded steel wire mesh reinforcement to B.S. 4483 and of the size and weight specified and made of wire to B.S. 4482.

B.38 Fixing Steel Reinforcement

Reinforcement shall be accurately bent to the shapes and dimensions shown on the Brawings and Schedules and in accordance with B.S. 4466 and B.S. 8110. reinforcement must be cut and bent cold and no welded joints will be permitted unless to detailed or directed by the Engineer.

Reinforcement shall be accurately placed in position as shown on the drawings, and before and during concreting shall be secured against displacement by

using No.18. S.W.G. annealed binding wire or suitable clips at intersections and shall be supported by concrete or metal supports, spacers or metal hangers to ensure the correct position and cover. No part of binding wire shall protrude into the specified nominal cover.

No concreting shall be commenced until the Engineer has inspected the reinforcement in position and until his approval has been obtained. The Contractor shall give two clear days notice of his intention to concrete to the Engineer. Approval forms shall be submitted in duplicates. (A sample of the format of the Approval form is attached at the back of this specification).

The Contractor is responsible for maintaining the reinforcement in its correct position, according to the drawings, before and during concreting. During concreting a competent steel fixer must be in attendance on the concretors to adjust and correct the positions of any reinforcement which may be displaced. The vibrators are not to come into contact at his own cost.

Unless permitted by the Engineer, welding of a bars is prohibited. Where permission is granted, welding shall be carried out in accordance with the recommendations of the institute of welding for the welding or reinforcement bars.

The Contractor shall provide on site facilities for cutting and bending reinforcement whether he is ordering his reinforcement bent or not and shall ensure that a token amount of straight bat of each diameter if available on site for bending as and when directed by the Engineer in order that minor modifications may be implemented on site without prior notice.

Bar bending schedules shall be issued to the Contractor at least a month in advance of the actual physical requirement in site. The Contractor is responsible for verifying that he has in his possession the required schedules to meet his programme and shall give the Engineer at least 3 weeks notice for any schedules that he requires.

F.39 Splices and Screwed Couples

Where specified in the works, splices and screwed couplers shall be CC1 systems type or similar approved and shall be for reinforcement bar sizes 16. 20. 25 and 32. The relevant certificates of performance shall be submitted to the Engineer for approval. The Engineer may order additional relevant tests be carried out through the Contractor from time to time as measure of continuous monitoring of quality and performance.

F.40 Position and Correctness of Reinforcement

The Contractor shall draw the Engineer's attention in good time if any discrepancies between details on drawings and bar bending schedules occur.

Irrespective of whether any inspection and/or approval of the fixing of the reinforcement has been carried but as above. It shall be the Contractor's sole responsibility to ensure that the reinforcement complies with the details on the drawings or bending schedules with the details on the drawings or and in position to give prescribed cover.

F.41 Spacer Blocks

Spacing blocks of approved size and shape made of concrete similar to that used in the surrounding construction and filed to the reinforcement or formwork by No. 18 S.W.G. wires set into the spacer blocks or other approved means shall be provided where necessary to ensure that the requisite cover is obtained. The Contractor is to include for providing sufficient such spacer blocks in his prices for steel reinforcement where such supplier has been nominated. Where composite blocks or other forms of bid construction are used, spacer blocks are to be provided as shown on the drawings. These will generally consist of concrete blocks as described above made to fit the width of the rib less 3mm to tolerance an with single or double grooves (depending on the number of the reinforcement bars used per rib) in the top surface with wire ties at each grove. The Engineer may direct that special types of spacers (e.g. performed plastic types) be used in the whole or part of the works. If in his opinion the concrete spacers are not to the required standard.

F.42 Nominal Concrete Cover to Reinforcement

Unless otherwise directed the nominal concrete cover to steel reinforcing bars (including links and distribution) in any face shall be:

Foundations against earth face	75mm
Foundation against blinding	50mm
Columns (main bars)	40mm
Slabs and stairs	20mm
Wall (main bars)	20mm

The tolerance on placing of bars achieve nominal cover is ±5mm.

F.43 **Fixing Fabric Reinforcement**

The fabric shall be free from scale, rust, grease or other substances likely to reduce the bond between the steel and the concrete and shall be laid with minimum 300mm laps and bound with No. 18 S.W.G. annealed iron wire.

F.44 **Projecting Reinforcement**

Where reinforcement projects from a concreted section of the structure and this reinforcement is expected to remain exposed for some time, it is to be coated with a cement grout to prevent rust staining on the finished concrete. This grout is to be brushed off the reinforcement prior to the continuation of concreting.

F.45 **Security Reinforcement**

Spiral

Spiral reinforcement where specified in the works shall be chubb spiral, Aegamesh or similar approved. It shall consist of steel bars of at least 15mm diameter forming a mattress with pitches not exceeding 125mmm, and shall be delivered to the site in preformed 2 row mattress cages of exact and specified dimensions and incorporating appropriate spacer bars to maintain mattress rigidity. When assembled, the cages shall define the outline of the elements to

be protected including allowance for openings. This assembling in the works shall be carried out under the supervision of the supplier's approved representative.

F.46 **Twisted Plates**

These shall be Chubb tangbats, John Tann bars, Tord cars or similar approved. They shall be made from 3mm thick mild steel plates cut into strips running off a central cord. They shall be transported to the site in flat condition where they shall be twisted into spirals.

The twisting and laying of the units shall be carried out under he supervision of the supplier's approved representative.

F.47 **Fixtures and Indentations in Concrete**

No openings, chases, holes or other voids shall be formed in the concrete without the prior approval of the Engineer. Details of any fixtures to be permanently built into the concrete including the proposed positions of all conduits 25mm and over in diameter shall be submitted to the Engineer for his approval before being placed.

F.48 **Chases, Holes, etc. in Concrete**

The Contractor shall be responsible for the co-ordination with the Electrical and other sub-contractors for incorporating electrical conduits, pipes, fixing blocks, chases, holes and the like in concrete members as required and must ensure that adequate notice is given to such sub-contractors informing them when concreting members incorporating the above are to be poured. The Contractor shall submit full details of these items to the Engineer for approval before the work is put in hand. All fixing blocks, accurately set out and cast with the concrete.

F.49 **Position of Electrical Conduit**

Unless otherwise instructed by the Engineer all electrical conduits to be positioned within the reinforced concrete shall be fixed inside the steel cages of

beams and between the top and bottom steel layers in slabs and similar members.

F.50 **Formwork**

The method and system of formwork which the Contractor proposed to use shall be approved by the Engineer before construction commences. Formwork shall be substantially and rigidly constructed of timber, steel, plastic, precast concrete or other approved material.

All timber formwork shall be good, sound, clean, sawn, well-seasoned timber free from warps and loose knots and of scantlings sufficiently strong for their purpose.

F.51 **Construction of Formwork**

All formwork shall be of sufficient thickness and with joints close enough to prevent undue leakage of liquid from the concrete and fixed to proper alignment, level and plumb and supported on sufficiently strong bearers, shores, praces, plates, etc., properly held together by bolts or other fastenings to prevent displacement, vibrations or movement by the weight of materials, men and plant on same and so wedged and clamped as to permit easing and removal of the formwork without larring the concrete. Where formwork is supported on previously constructed portions of the reinforced concrete structural frame, the contractor shall by consultation with the Engineer ensure that the supporting concrete structure is capable of carrying the load and/or sufficiently propped from lower floors or portions of the frame to permit the load to be temporarily carried during construction.

Soffits for beams and slabs of spans greater than 10m shall be erected with an upward camber of 5mm for each 3.0m of horizontal span or as directed by the Engineer without reducing the depth of the element.

Great care shall be taken to make and maintain all joints in the formwork as tight as possible to prevent the leakage of grout during vibration.

All faulty joints shall be caulded to the Engineer's approval before concreting.

The formwork shall be sufficiently rigid to ensure that no distortion or bulging occurs under the effects of vibration. If at any time the formwork is insufficiently rigid or in anyway defective the Contractor shall strengthen or improve such formwork as the Engineer may direct.

The Contractor's attention is drawn to the various surface textures and applied finishes required and the faces of formwork next to the concrete must be of such material and construction and be sufficiently true to provide a concrete surface which will in each particular case permit the specified surface treatment or applied finish.

All surfaces which will be in contact with concrete shall be piled or greased to prevent adhesion of mortar. Oil or grease shall be of a non-staining mineral type applied as a thin film before the reinforcement is placed. Surplus moisture shall be removed from the forms prior to placing of the concrete. Great care shall be taken to avoid oiling or greasing the reinforcement.

Temporary openings shall be provided at the base of columns, wall and beam forms and at any form points where necessary to facilitate cleaning and inspection immediately before the pouring of concrete. Before the concrete is placed the shuttering shall be true-up and any water accumulated therein shall be washed out or otherwise removed from within the formwork. The reinforcement shall then be inspected for accuracy of filing. Immediately before placing the concrete the formwork shall be well wetted and inspection openings shall be closed. Cement slurry shall be applied to previously casted concrete as necessary to allow for adequate bonding. The erection, easing, striking and removing of all formwork must be done under the personal supervision of a competent foreman, and any damage occurring through faulty formwork or its incorrect removal shall be made good by the Contractor at his own expense.

After removal of formwork, all projections, fins, etc.. on the concrete surface shall be chipped off, good to the requirements of the Engineer. Any voids or moneycombing shall be treated as described under "Faulty Concrete".

F.52 **Stripping Formwork**

All formwork shall be removed without undue vibration or shock and without damage to the Concrete. No formwork shall be removed without the prior consent of the Engineer. The Contractor shall notify the Engineer of his intended removal of any formwork at least two days in advance. The minimum periods that shall elapse between the placing of the concrete and the striking of the formwork will be as follows:

Beam sides, walls and columns (unloaded)	2 days
Slab soffits (props left under)	3 days
Beam soffits (props left under)	7 days

Removal of props to: (partly subject to 7 days concrete cube Strength being satisfactory)

Slabs	10 days
Beams	14 days
Cantilever beams and slabs	28 days

In continuous spanning slabs or beams, no span shall be depropped until the adjoining spans have been cast and cured for the specified periods.

Stripping and re-propping will not be permitted. The striking times indicated herein are for normal conditions and shall be adjusted if:

a) The span of the structural member under consideration exceeds 6.0m for beam. Additional period of one day for each 500mm of additional span shall then be allowed.

b) The dead load of the structural member under consideration forms a large proportion of the total design load.

c) The setting of the concrete has been retarded for any reason.

d) Any combination of the above points and other consideration which would call for such a precaution to be taken.

In any case, props shall be left in place in the lower two consecutive floors over which construction loads are expected to be supported.

F.53 **Surface Finishes**

Fair Face Finish

Where fair face finish is specified the concrete shall be brought to a perfectly true smooth and even surface by rubbing with carborandum stone dipped in cement grout. Such work must be commenced within one hour of removing the formwork and be actively and rapidly pursued until completed, the object being to complete the finish as soon as possible after the removal of the shuttering. On no account may such work be postphone to a later stage in the Contract. Fair face surfaces shall be clean, smooth, even true to form and free from all board marks. Joint marks, honeycombing, pitting etc. The Contractor is permitted at his own expense to provide smooth lining to the forms which will achieve the required finish without rubbing down. All rubbed down work must be lightly washed with plain cold water at the completion of the Contract, and hot before the cement grout used in the finish is at least four weeks old after initial mixing.

Wrought Lines Formwork

The shuttering shall be constructed of wrought tongued and grooved boarding, plywood or blackboard lined with approved laminated plastic sheeting to produce a concrete surface with truly flat surface completely free from all air bubbles. Joints marks, honeycomb and other bittances and blemishes to the approval of the Engineer.

Should the Contractor desire to use alternative materials he should submit his proposals to the Engineer for approval.

Should the Contractor fail to obtain approval and the Engineer subsequently rejects the work, the Contractor will at his own expense carry out all work necessary to attain the approval of the same.

Tamped Finish

Areas so specified shall be finished at the time of casting with a tamped finish to the Engineer's approval produced by an edge board. Board marks are to be made to a true pattern and will generally be at right angles to the traffic flow. Haphazard or diagonal tamping will not be accepted.

Board Marked Finish

Where so directed or measured the finish shall be that of a board marked pattern panels, the boards shall be arranged vertically and of widths and sizes all as detailed on the drawings. All exposed concrete will be left unpainted and therefore every care and attention shall be paid to obtain a satisfactory visual appearance and that maintenance of the same throughout the building operation. The finished surfaces shall be free from blow holes, hungry patches and other blemishes, and a sample panel is to be provided and approved by the Engineer before work commences.

Unless otherwise specified, the wormwork shall be rip sawn softwood to the Engineer's approval and shall have a sufficiently strong grain to impart a corresponding pattern on the concrete surface. Unless otherwise approved it shall have four uses only and shall be carefully cleaned from adhering grout after each use. It shall be lightly oiled with an approved non-staining mould oil.

Vertical Ribbed Finish

Unless otherwise specified, vertical ripped finish to walls shall comprise 50 x 50mm concrete projections at 450mm centres cast vertically on the face of wall. All surfaces are to be as described under "Wrought Formwork".

Diagonal Ribbed Finish

Unless otherwise specified, ribbed finish to walls shall comprise 50 x 25mm deep concrete projections at 100mm centres cast at 45 degree angle to the vertical on face of wall. All surfaces are to be described under "Wrought Formwork".

Chisel Dressed Finish

Where specified a chisel dressed finish is to be carried out on any grade of concrete out not until it is at least 30 days old. The surfaces are to be fully chisel dressed to remove a maximum of 12mm (average 9mm) of the surface to expose the aggregate without excessive cracking or breaking thereof.

Where the drawings show details of arises of columns, beams etc. these are to be performed with timber fillets set in the formwork and care must be taken in working up to those to preserve a clean line. For vertical surfaces of walls and columns, particular care must be taken to remove all sharp projections. For beam soffits this requirement is not necessary.

All chisel dressed surfaces are to have the margins chisel pressed by hand for a minimum width of 75mm commencing from the fillet edge. Thereafter mechanical chisel dressing may be used but the Contractor must ensure that a uniform texture and even plan surface is achieved. The use of pointed steel tools for both hand and mechanical chisel dressing is essential. Upon completion the surfaces are to thoroughly wire brushed and washed down and protected during the course of construction from damage, dirt, cement grout etc.

F.54 Precast Concrete

General

Unless otherwise approved by the Engineer, all precast concrete construction shall be carried out on the Site and shall conform to requirements given elsewhere in these preambles.

The maximum size of coarse aggregate concrete shall not exceed 20mm except for thickness less than 75mm where it shall not exceed 10mm.

The compacting of precast concrete shall conform with requirements given elsewhere in these preambles except for thin slabs where use of immersion type vibrators is not practicable. The concrete in these slabs may be consolidating on a vibrating table or by any other methods approved by the Engineer.

Steam curing of precast concrete will be permitted. The procedure for steam curing shall be subject to the approval of the Engineer.

The precast work shall be made under cover and shall remain under the same for seven days. During this period and for a further seven days the concrete shall be shielded by sacking or other approved materials kept constantly wet. It shall then be stacked in the open for at least a further seven days to season before being set in position. Where steam curing is used these times may be reduced subject to the approval of the Engineer.

Precast concrete units shall be constructed in individual forms. The method of handing the precast concrete units after casting, during curing and during transport and erection shall be subject to the approval of the Engineer, providing that such approval shall not relieve the Contractor of responsibility for damage to precast concrete units resulting from careless handling.

Repair of damage to the precast concrete units, except for minor abrasions of the edges which will not impair the installation and/or appearance of the units will not be permitted and the damaged units shall be replaced by the Contractor at his own expense.

Except where precast work is described as “fair face” or as having “exposed aggregate” or terrazzo finish the moulds shall be made of suitable strong sawn timber true in form to the shapes required. Unless otherwise described faces are to be left rough from the sawn moulds.

Where precast work is described as “fair face” the moulds are to be made of metal or are to have metal or plywood linings or are to be other approved moulds which will produce a smooth dense fair face to the finished concrete suitable to receive a painted finish direct and free from all shutter marks, holes, pittances, etc. In his prices for such precast work the Contractor shall include for all rubbing down to produce the finish required to the satisfaction and approval of the Engineer. Where precast work is to have an “exposed aggregate” or terrazzo finish the moulds shall be constructed to the requirements given for moulds “finished fair” work. The method of achieving the exposed aggregate finish shall be aggregate transfer” or other approved method.

F.55 Precast Concrete Cladding Units

These shall be cast to the general details shown on the drawings. The Contractor shall submit working/shop drawings for each type of the cladding panels to the Engineer for approval before he commences casting operations.

The panels shall be cast in special yards and shall be cured adequately before being hoisted into position in the structure, taking care that no parts are broken in the process. The units shall then be joined together with insitu concrete and flexibility connected to the top and bottom beams to allow for limited movement of the combined unit.

F.56 Hollow Block Suspended Construction (Composite Floor Slab)

Concrete hollow blocks for use in the composite floor slabs shall be of the standard sizes required or as shown on the drawings and are to be of adequate strength to support the concrete during placing and consolidation by vibration. Blocks are to be manufactured in accordance with the procedure specified in B.S. 6073 and to be of a mix not weaker that 1:4:8 cement: sand: stone using maximum 10mm size aggregate.

Concrete blocks are to be cured for at least 28 days before use on the site. During the first seven days of curing, blocks are to be kept permanently damp and protected from exposure to sun and wind.

Concrete blocks are to be well wetted before the pouring of cement.

Hollow clay filler blocks for use in the composite floor slabs are to be of the sizes shown on the drawings and to be of adequate strength to support the concrete during placing and consolidation by vibration. They shall be obtained from an approved manufacturer. Before any orders are places, at least 6 sample clay blocks shall be provided for the approval of the Engineer. Any clay blocks subsequently delivered to site which ion the opinion of the Engineer are not of equal standard to the approved samples shall be rejected.

Rejected blocks shall immediately be removed from the site and shall not be used in the works. Clay blocks are to be fully cured before delivery or use on site.

Clay blocks are to be well wetted before pouring of concrete.

F.57 Composite Floor Construction

The hollow block floor construction is generally to be as shown on the Engineer's Drawings.

Care shall be taken in placing blocks to ensure that they are set out in accordance with the details shown on the Drawings and that they run truly in line without encroaching on the width of the insitu ribs.

The open ends of hollow blocks, if adjacent to concrete to be placed insitu are to be plugged or stopped to prevent the concrete from flowing into the void and the Contractor is to include for this in his prices.

The Contractor should note that slip tiles are not to be used to the Soffits if ribs and he is to take this into consideration in pricing the items of formwork to the soffit of hollow block floor construction. Before concreting is carried out the blocks are to be thoroughly wetted.

Care should be taken during concreting that the width of ribs between the rows of blocks and the solid insitu concrete shown on the Drawings adjacent to supporting beams is not encroached upon by the blocks.

It is essential that the concrete topping be poured at the same time as the ribs between hollow blocks

Reinforcement shall be positioned accurately with required cover in accordance with the drawings and using the particular spacing blocks with wire ties as previously described. Spacer blocks shall be provided in ribs at not more than 0.2 m Centres. Care must be taken during concreting that the reinforcement is not displaced.

Where holes or services occur, the necessary holes or pockets shall be accommodated by the replacing of a hollow block or insitu concrete or the widening of a rib all in accordance with the Engineer's instructions.

prices for such holes through block construction are to include the rearrangement or substitution of the hollow block with solid concrete in addition to the actual formation of the hole.

F.58 Concrete Surface Beds

Before placing concrete and where specified or shown on the Drawings a layer of 1000 gauge polythene or diothene sheeting shall be laid on the blinding above the hard core filling. Minimum 300mm laps shall be provided at all joints.

The concrete shall be placed as soon as possible after being mixed. In transporting the concrete, adequate precautions shall be taken to avoid damage to the prepared base. The concreting shall be spread to such a thickness that when compacted it shall have the finished thickness as specified or whom on the Drawings. A layer of concrete 25mm less than the finished thickness shall first be spread and struck off at the correct level to receive the top fabrics reinforcement.

The top layer shall then be added. Not more than 30 minutes shall elapse between spreading the bottom layer and the start of compaction of the top layer. The Contractor shall be responsible for maintaining the reinforcement in its correct position during the placing and compaction of the concrete. The compaction and finishing of the concrete shall be effected by immersion vibrators and a hand or mechanical tamper weighing not less than 10kg per meter run and having a edge shod with a steel strip 75mm wide fixed to a tamper by countersunk screws. Immersion vibrator width "spade" attachments will be permitted. Compaction shall be continued until a dense, scaled surface finish is achieved. Overcompaction causing an excessive amount of fines to be brought to the surface shall be avoided.

- The level shall be within + or – 6mm of the levels

- The falls shall be within 10% of the falls specified

- The smoothness shall be such that departures from a 5mm straight edge laid in any direction shall not exceed 3mm.

- Minor irregularities shall be made good by the use of a steel float but in no circumstances shall mortar be used to make good the surface.

As soon as the surface has been finished, it shall be protected against top-rapid drying by means of damp Hessian, white polythene sheeting or other approved means placed carefully on the surface and kept damp and in position for 7 days and the concrete shall be kept wet for a further 21 days. The most critical period is the first 48 hours after placing and curing during that time shall be very thorough.

The Contractor is to obtain the Engineer's approval to the material and method he proposes to use for curing and no concreting will be permitted until sufficient such material is on site.

Forms shall not be removed from freshly placed concrete until it is at least 24 hours old. Care shall be taken that in their removal no damage is done to the concrete but should any damage occur the Contractor shall be responsible for making it good.

F.59 Expansion Joints in Concrete Surface Beds

Expansion joints shall be positioned and constructed as shown on the drawings. The joints in the surface beds shall be absolutely square and true to line and position.

All joints in surface beds shall be formed to the patterns and shapes to coincide exactly with the joints in the surface finish or as otherwise indicated on the drawings. Formork shall be manufactured from steel of heavy angle section and be to the Engineer's approval. The Contractor shall submit drawings of the forms he intends to use and obtain the Engineer's approval before fabrication. Panels shall be poured in alternate bays as agreed with the Engineer. No construction joints other than those indicated on the Drawings shall be submitted.

WALLING

LIST OF CLAUSES

MATERIALS

WORKMANSHIP

MATERIALS

G.1 Cement

Cement used for making mortar shall be as described in “concrete work”.

G.2 Lime

The lime for making mortar shall be obtained from an approved source and shall comply with BS 890 Class A for non-hydraulic lime. The lime to be run to putty in an approved lined pit or container. The water to be first run into the pit or container and the lime to be added until it is completely submerged, stirred vigorously until all lumps are disintegrated and shall be kept constantly covered with water and regularly stirred for at least four weeks. The resulting milk-lime then to be run through a fine sieve and run into a pit or other container and kept clean and moist for not less than two weeks being used in the works.

G.3 Sand

Sand used for making mortar shall be clean, well graded siliceous sand of good sharp hard quality equal to samples which shall be deposited with and approved by the Architect. It shall be free from lumps of stone, earth, loam, dust, salt, organic matter and other deleterious substances, passed through a fine sieve and washed with clean water if so directed by the Architect.

G.4 Water

Shall be as described in “Concrete work”.

G.5 Concrete Blocks

Concrete blocks shall comply with the requirements of B.S.2028, 1384 except where amended or extended by the following clause. Blocks shall have square arises and corners. For fair-faced work damage to arises and corners shall not exceed the removal of 6mm of the blocks depth or thickness.

Concrete blocks shall have a minimum crushing strength of 3.5N/mm except when below the damp course level or in contact with soil hen they shall have a minimum crushing strength of 7N/mm. Unless noted otherwise on drawings. Hollow concrete blocks shall not be used below the damp course level or in contact with soil.

Concrete blocks used for external walls shall be Class 'A' and for internal load bearing walls they shall be at least Class 'B'. Class 'C' blocks shall only be used for non-load bearing.

No precast blocks shall be incorporated into the works unless approved by the Architect. The delivery of precast blocks from which samples tested do not comply with this specification shall be deemed defective. Any work constructed with blocks from which samples tested do not comply with this specification shall be deemed to be defective.

From every 1,000 precast concrete blocks delivered to site, ten block samples shall be provided for testing. The precast block samples shall be selected in accordance with B.S. 2028, 1364. Samples of precast concrete blocks for testing shall be tested for the following properties in accordance with the methods given in B.S.2028,1364 and the test results shall comply with the requirements of B.S. 2018, 1364 except where amended by this specification:

a) Drying Shrinkage

b) Compressive strength or transverse breaking load (as applicable)

c) Wetting expansion*

d) Density

e) Dimensional Tolerance

f) Cavity size

*Test only applicable for concrete blocks made with clinker aggregate.

Blocks shall also be tested to determine the suction rate. The test shall consist of weighing the bloc, placing in a tray of water such that only 3mm of the block side is immersed for a period of sixty seconds +/- 2 seconds: quickly wiping off excess water and reweighing. He suction rate is the increase in weight due to water absorbed and shall not exceed 2kg/m minute. Blocks which have suction rate exceeding 2kg/m/minute may be used if the Contractor uses an approved water reactive aggitive in the mortar or can show that the blocks are wetted such that the blocks will have a suction rate not exceeding 2kg/m/minute for a period of 24 hours from being laid and provided the blocks simply with all other requirements.

Concrete blocks shall be stacked on prepared dry areas free of clinker, ashes and sulphate bearing strata. Blocks of different strengths shall be stacked separately and clearly marked to differentiate the strengths.

Blocks shall not be used for a minimum of 7 days after manufacture and shall not be loaded for at least 14 days after laying. For the first 7 days after manufacture, blocks shall be cured by maintaining in a damp condition, e.g. covering with polythene sheeting after wetting blocks.

G.6 Hollow Clay Blocks

Hollow clay partition blocks shall comply with the provisions of B.S.1190 Section 1 and are to be hard, well burnt true to size and shape and with sharp arises and keyed faces and joints and are to be obtained from a approved manufacturer and to be equal in every respect to a sample to be deposited with and approved by the Architect.

Blocks are to be 190mm high (to give 200mm course height including the joint) and of the thickness given herein. Cutting of blocks is to be avoided wherever possible and full use is to be made of quarter, half and three quarter blocks and blocks with conduit recesses.

G.7 Louvre Block Walling

i) To be precast concrete mix 1:1:5:5 or 25N/mm (12mm aggregate) but with 10mm finished fair on all exposed surfaces, built in cement and sand (1:5) mortar with straight horizontal and vertical joints to flush pointed both sides.

ii) Each block to be size 200mm x 400mm x 200mm high and consisting of two ends each 200mm x 200mm x 50mm thick joined with a 50mm thick twice cranked louvre with top end of louvre projecting 40mm above top of block.

G.8 Stone

All stone shall comply with the requirements of CP 121.202 for masonry and rubble walls respectively except where amended or extended by the following clauses.

Unless otherwise noted, allmasonry walls shall be coursed squared rubble walling with mortar joints.

The sizes of stones for rubble walling shall be such that the length of stone does not exceed three times its height. For course squared rubble walls blocks shall not exceed 300mm in height and shall be not less than 150mm in height.

Where snacked rubble walls are specified, the sneaks shall not be less than 100mm square on the exposed face.

Stone for masonry shall have a minimum compressive strength of 10N/MM. (Stone shall not be required to be tested to failure). The density of stone for masonry shall be not less than 230kg/m. The drying shrinkage of stone shall not exceed 0.05%.

Samples of stone provided for testing shall be tested for the following in accordance with the methods given in B.S. 2028, 1364 and the test results shall comply with the requirements of this specification:

a) Compressive strength

b) Density

c) Drying shrinkage

The colour and texture of stone shall be uniform and consistent. Prior to delivering any tone to site, the Contractor shall supply the Architect with a sample of stone in order that he may approve the colour and texture. The Contractor shall ensure that sufficient suitable stone is available for the whole of the project prior to ordering the stone.

Where cast stone including stone described as artificial stone, reconstructed stone, etc. is specified the stone shall comply with the requirements of B.S. 1217.

Masonry shall be of stone having no irregular faces and only the back face if not visible shall be left as from the saw.

Prior to ordering dry stone the Contractor shall demonstrate that the stone is durable. This may be done by supplying details of buildings constructed with stone from the same quarry and which has been exposed to the same environmental condition for at least ten years.

The maximum projection from the face of stone rubble walls shall be 20mm beyond the specified face of the wall.

The Contractor shall provide six samples of stone measuring 150mm x 150mm for testing prior to delivering any stone to site. As work proceeds the Contractor shall provide six samples 150mm x 150mm x 150mm for testing from every 300m of work.

All stone shall be stacked on prepared dry area free of clinker, ashes and sulphate bearing strate.

G.9 Multi-Colouring Stone Walling

Stone for multi-coloured stone walling shall have at least three distinct colours but shall in any case be to the approval of the Architect. A sample panel of walling shall be built and on approval of the Architect will be the minimum standard for the works.

G.10 **Fire Bricks**

Clay fire bricks shall be obtained from an approved source and shall be hard, sound, square and clean, well burnt and in respect of size shall comply with B.S. 3921 : 1974 Section 2.

G.11 **Wall Reinforcement**

Where described walls and partitions shall be reinforced with a 25mm wide strip of No.20 S.W.G. hoop iron built in alternate horizontal joints in the wall centre. The reinforcement shall be lapped and hooked at running joints, angles and intersections and carried at least 115mm into abutting walls at junctions.

G.12 **Wall Ties**

To be 3mm diameter galvanized mild steel wire twisted butterfly wall ties.

G.13 **Damp-Proof Courses**

The bituminous felt sheeting for damp-proof courses shall be Hessian based bituminous felt complying with B.S. 743 Type 4A weighing not less than 3.85kgs per square metre. The sheeting is to be lapped 150mm at running joints and the full width of walls at angles.

WORKMANSHIP

G.14 **Cement Mortar**

Mortar described as cement mortar 1:4 shall be composed of 1 cubic metre (1498 kgs.) of Portland Cement and 4 cubic metres of sand. Other mixes such as 1:3, 1:5 etc shall be similarly constructed.

G.15 **Mixing of Mortar**

The constituent materials shall be measured separately when dry in specially prepared gauge boxes of sizes to give the proportions specified without

consideration of the contents by ramming and shaking. The mortar shall be mixed in an approved power driven mixer for not less than two minutes per patch and using the minimum quantity of water necessary to obtain a working consistency. The mixer shall be used within 30 minutes of mixing. No partially or wholly set mortar will be allowed to be used or re-mixed.

G.16 General Construction

a) Setting Out

The Contractor shall provide proper setting out roads and set out all work on some for course, openings, heights etc., and shall build the walls, piers etc., to the widths, depths and heights indicated on the Drawings and as directed by the Architect.

b) Building in Wood Frames

Openings for doors, ventilators etc., are to be set out and left unbuilt until the wooden frames have been fixed in position.

c) Building in Metal Windows and Doors

Openings for metal frames are to be wide enough for the frames to fit without being forced into position. Build the lugs into the joints of the walling and fill in the space between the walling and frame with cement mortar well tamped into the channel of the frames and point all round externally.

All frames must be set plump and level and free from twist.

d) Walls to Receive Plaster & Similar Finishes

All faces of walls to be plastered etc., to have all projections dressed off and joints raked out as key.

G.17 Building walling

a) **Laying and Jointing**

All blocks shall be well wetted before being laid and the top of walling where left of shall be well wetted before commencing building. Walls to be kept wet three days after building. All walls throughout the works shall be carried up evenly in 200mm courses except where courses of less depth are required to bring walling up to level of floors, windows and the like and where otherwise described, no part being allowed to be carried up more than one metre higher at one time than any other part and in such cases the joining shall be made in long steps so as to prevent cracks arising and all walls shall be leveled round at each stage. Not more than 3 metre height of wall shall be laid in any one day.

Blocks shall be bedded and jointed in cement mortar as described with beds and joints 10mm thick, all flushed up and grouted solid as the work proceeds.

b) **Bonding**

The block shall be properly bonded together and in such manner that no vertical joint in any course shall be within 115mm of a similar joint in the courses immediately above and below. All walling of 300mm thickness or less shall be built in single thickness of blocks. Walling exceeding 300mm in thickness shall be built with through bounders not more than 1070mm apart in each course as directed by the Architect.

Alternate courses of walling at all angles and intersections shall be carried through the full thickness of the adjoining wall. All perpends, reveals and other angles of the walling shall be built strictly true and square.

c) **Tolerance**

All courses of walls shall be level with a maximum deviation of +/-3mm in any one metre length and a maximum overall deviation of 10mm for length of wall exceeding 3 metres. Walls shall be plumb with a maximum

deviation of +/-3mm in any metre height of wall with a maximum deviation of +/-10mm in the total height of the wall of any storey.

All corners of walls which are shown as being at right angles shall be square with a maximum deviation of 3 in 1000. All walls shall be straight with a maximum deviation of +/-3mm in any one metre length and a maximum overall deviation of 10mm in any length exceeding 3 metres.

All bed and vertical joints shall be an average of 10mm thick with a maximum deviation of +/-3mm of blockwork and stone rubble walls. Joints for stone masonry walls shall be 6 mm +/-1mm thick.

d) Curing

All walls shall be maintained in a damp condition for at least 24 hours after laying. Walls under construction shall be dampened by applying water with a brush and no hosing directly on to the wall shall be permitted. When work ceases on any section of wall polythene or hessian shall be draped over the wall for at least 24 hours. If hessian is used, it shall be maintained continuously wet.

e) Cavities

Cavity walls shall be of the overall thickness shown on the drawings.

Cavities above ground level between leaves of block or masonry shall be free of mortar droppings or other debris. The Contractor shall take proper precautions to prevent mortar or debris entering the cavity.

Cavities below ground level shall be filled with mortar for cavities up to 75mm wide and for cavities over 75mm wide filling shall be concrete mix 1:3:6. Cavities shall be filled such that there is maximum of three times the thickness of the thinner leaf of the wall filled with wet mortar or concrete unless the wall is continuously supported for the depth.

f) Backfilling

Earth backfilling against walls shall be carried out such that the level of the backfill is always equal on each side of the wall.

When a wall has filling material on one side only to a fill width of more than three times the wall thickness, the wall shall be continuously supported during backfilling.

Backfilling shall not be carried out until at least seven days have elapsed since the laying of the blocks or stone.

G.18 Reinforced Walls

Steel reinforcing bars in walls shall be carefully placed and spacers used to ensure that a minimum of 20mm cover is given to the reinforcement unless otherwise specified.

Horizontal reinforcement in mortar joints shall be laid such that the reinforcement is not in contact with the blocks or stone.

G.19 Wall Ties

Wall ties shall be provided to connect walls to steel or Concrete columns and beams to connect two unbounded leaves of wall.

wall ties shall be provided at 450mm centres both vertically and 900mm centres horizontally and shall be staggered when used to connect two leaves of unbounded wall. wall ties shall be embedded into each material by a minimum of 50mm

G.20 Fair Face

All concrete and hollow blockwork described as finished with a fair face is to be built to a true and even face with the joints finished as specified hereinafter.

G.21 Pointing

Pointing of walls shall be prepared for painting by raking out all loose or friable material to a minimum of 15mm to form a square recess. The joints shall then be wetted and new mortar shall be forced into the joints and finished as directed.

G.22 Holes, Cutting and Chasing

a) All putlog holes shall be not less than one course deep and carefully filed with a block cut to fit size of opening with beds and joints filled with mortar well tamped in after scaffolding is removed, and if in faced walls to match facing.

b) Where walling is cut, holed or chased for conduits, pipes and the like all such cuttings etc., shall be filled in with cement mortar (1:4) prior to the application of finishes.

ASPHALT WORK

LIST OF CLAUSES

GENERALLY

MATERIALS

WORKMANSHIP

J.15 Outlets

J.16 Felt underlay

J.17 Test for falls

J.18 Protection

GENERALLY

J.1 Approved firm

All work shall be executed by a firm approved by the Architect in writing.

J.2 Samples

The Contractor shall, as and when required by the Architect, submit and deliver samples of any materials for testing.

J.3 Statement as to screed and underbed

The Contractor is to obtain from the Sub-Contractor a statement in writing to the effect that the screed and/or underbed is clean and otherwise satisfactory before the coverings or asphalt are laid. A copy of the statement is to be forwarded to the Architect.

J.4 Guarantee

The Contractor is to obtain from the approved Sub-Contractor for asphalt work, 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 Sub-Contractor shall, at his own expense, make good to the satisfaction of the Architect all and any defects in the asphalt work which shall be attributable to improper materials or faulty workmanship, and shall bear the cost of any consequential damage as is provided for in such guarantee.

MATERIALS

J.5 Asphalt for Tanking

Asphalt for Tanking shall be Tropicalised Mastic Asphalt to B.S. 1097/1966 applied in three coats; in the case of horizontal work on and including sheeting felt, in the case of vertical work without. The third and final coat is to have a polished finish.

J.6 Asphalt for Roofing

Asphalt for roofing shall be tropicalised and comply with B.S. 988 table 3, column 2

J.7 Felt Underlay

The underlay shall be impregnated flax black sheathing felt complying with B.S. 747 (TYPE 4a) (I) weighing 17kg per 25 metres roll.

J.8 Rubbing sand

Rubbing sand shall be clean natural coarse sand.

J.9 Preparation of Surfaces

All surfaces to receive asphalt are to be dry, rough and finished to the requirements and to the entire satisfaction of the asphalt Sub-Contractor.

J.10 Melting Asphalt on Site

Asphalt blocks shall be broken into pieces of convenient size and carefully melted in caldron or mechanically agitated mixers on the site at a temperature not exceeding 215deg.C., (420 deg.F), or the molten material may be delivered to the site in mechanically agitated mixers.

J.11 Dusting of Buckets

Buckets used for carrying molten asphalt shall be dusted with a fine inert dust. On no account shall ashes or oil be used or this purpose.

J.12 Laying

Asphalt shall be laid in bays generally not exceeding 2 metres wide, and succeeding coats shall be laid breaking joint. Junctions and fillets shall be properly married, the laid asphalt being heated by the application of hot metrial, whole being worked so that the joints are neatly made.

Surfaces of roofing shall be finished with rubbing sand, which shall be subsequently brushed off and the whole surfaces
made perfectly clean.

J.13 Air Pockets and Stains

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

J.14 Joints and Fillets

Joints in all asphalt work shall be carefully made and complete fusion obtained to make them water-tight. Fillets shall be run at all internal angles and in at least two operations. Perfectly water-tight joints shall be made a around pipes passing through walls and floor and around gullies, etc.

J.15 Outlets

All outlets to be fixed 25mm below finished screed level.

The Contractor must ensure that all necessary plumbing, outlet, etc., pipes passing through roofs are fixed in position before laying asphalt is commenced.

J.16 Felt Underlay

Felt underlay shall be laid loose with 75mm laps.

J.17 Test for Falls

To ensure that asphalt has been truly laid to falls, (minimum 40mm in 3 metres), the Contractor shall arrange for roof areas to be flushed with water in the presence of the Architect. Any defects or depressions in the asphalt shall be rectified and retested for approval.

J.18 Protection

The Contractor is to take all necessary precautions to ensure that no damage is caused to the tanking or roofing after its completion, by further building work, excessive traffic or any other cause whatsoever.

ROOFING

LIST OF CLAUSES

SLATE OR TILE ROOFING

CORRUGATED OR TROUGHED SHEET ROOFING

TIMBER SHINGLE ROOFING

BITUMINOUS FELT ROOFING

COLAS BITUMINOUS ROOFING

K.21 Approved firm
K.22 Samples
K.23 Statement as to screed and underbed
K.24 Guarantee
K.25 Materials generally
K.26 Preparation of surfaces
K.27 Laying generally
K.28 Air pockets and stains
K.29 Joints and fillets
K.30 Outlets
K.31 Tests for falls
K.32 Protection

TILE ROOFING

K.1 Polythene underlay

To be 1000 gauge black polthene sheeting laid paralled to the eaves with 300mm horizontal and 600mm vertical laps, pulled taut and nailed at not exceeding 300mm centres to roof timbers under. At hips lay and fix 600 mm wide strip to overlap general underlay: at valleys lay and fix similar strips to underlap general underlay.

Nails to be 20mm long galvanised steel large headed felt nails.

K.2 Bituminous felt underlay

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

K.3 Mangalore clay roof tiles

To be 380mm x 225mm tiles of approved quality uniform in size, shape and colour, hard, well burnt and free from defects. All ridges and other special tiles must be from the same manufacturer and must match the tiles with which they are laid.

All tiles are to be laid to the correct gauge on treated sawn timber battens, each slope of the roof being set out to take an exact number of whole tiles without any cutting at ends and with straight joints true from top to bottom.

The top and bottom courses, every fifth course and verge tiles to be nailed using 50mm galvanised nails.

At verges special left hand verge tiles are to be used.

Ridge and hip tiles to be bedded and jointed in cement mortar (1:4) and pointed in mortar coloured to attach the tiles. Angles and intersections to be accurately cut and rubbed to form a neat close joint.

Valleys are to be neatly cut to an accurate edge to expose not more than 75mm of the valley gutter lining.

No cracked, chipped or otherwise broken tiles will be allowed in the works and all tiles discoloured or defaced by mortar droppings are to be replaced at the Contractor's expense.

K.4 Mareba concrete roof tiles

To be 420 mm x 335 mm Double Roll Single Lap tiles obtained from Mareba Enterprises Ltd., Nairobi, and laid and fixed in accordance with their printed instruction.

Tiles are to be in colours selected by the Architect and all ridges and other special tiles must be from the same manufacturer and must match the tiles with which they are laid.

All tiles are to be laid to the correct gauge on treated sawn timber battens, each slope of the roof being set out to take an exact number of whole tiles without any cutting at ends and with straight joints true from top to bottom.

The top and bottom courses, every fifth course and verge tiles to be nailed using 50mm galvanised nails.

At verge special left hand verge tiles are to be sued.

Ridge and hip tiles are to be bedded in cement mortar (1:4) and visible joints pointed in matching coloured compound obtained from the tile manufacturer.

Any cutting on tiles and specials shall be accurately executed with a power driven masonry saw and any exposed raw edges coloured with compound as before described.

No cracked, chipped or otherwise broken tiles will be allowed in the works and all tiles discoloured or defaced by mortar droppings are to be replaced at the Contractor's expense.

K.5 Manson Hart concrete roof tiles

To be 380 mm x 230 mm Double Roll Single Lap tiles, or 420 mm x 330 mm low pitch tiles as described hereafter, obtained from Manson Hart (Kenya) Ltd.

Tiles are to be in colours selected by the Architect and all ridges and other special tiles must be from the same manufacturer and must match the tiles with which they are laid.

Fixing specifications will be similar to these for Mareba Concrete Roof Tiles above.

K.6 Clay pantile roofing

Clay Pantile shall be 345 mm x 245 mm, bedded in cement and sand (1:4) mortar to 270mm gauge with 75mm end laps and 50 mm side laps. The tiles

shall be mitred on two diagonally opposite corners in order that the tiles bed true.

Ridges shall be formed with half round clay ridge tiles bedded in matching cement and sand (1:4) mortar with slip tile pieces inserted into the bedding mortar in the valleys of the top course of tiles. A similar method of filling the ends of pantiles along the eaves course is to be adopted.

Care is to be taken to bed the tiles in straight lines in both directions and any irregular, warped or misshapen tiles are to be discarded and removed from site.

K.7 Examine roof coverings

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

K.8 Sheet roofing generally

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

K.9 Steel sheet and aluminum sheet roofing

(i) Corrugated steel sheets are to conform to KS06-02 Part 1 and are to be galvanised after formation and of the gauges specified, laid with 11/2 corrugation side laps and 150mm end laps. Sheets are to be properly stacked on battens and if kept in the open are to be stacked inclined to facilitate run-off of 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 6mm galvanised 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 aluminum

Washer immediately below the screw head 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 to give a 0.80mm clearance on the bolt or screw.

(iii) Pre-painted roofing sheets are to be finished with coating of an approved colour sprayed on and oven cured at the works. Care is to be taken to avoid damage to the finish and small scratches and blemishes are to 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 if prepainted, are to properly match the colour of the roof sheeting.

K.10 **Asbestos cement sheet roofing**

(i) To be either Simbarite Super Seven, Standard Three or Romana sheet roofing as manufactured by the Kenya Asbestos Cement Co. Ltd, P.O. Box 90662 Mombasa. 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 and PVC caps and washers, except Romana tiles which shall be fixed with 7 x 120 mm hexagonal head roofing screws and galvanised washers, painted to match the colour of the tiles, all to be obtained from Kenya Asbestos Cement Co. Ltd.

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

should be drilled through the 2nd and 4th crowns. Super Seven sheets should be drilled through the 2nd and 13th crowns. In all instances the crowns should be counted in the direction of laying.

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

In order to provide close fitting of the sheets two diagonally opposite corners of each sheets two diagonally opposite corners of each sheet are to be mitred. For sheets laid from left to right, mitre the bottom right hand and top left hand corners, and for sheets laid from right to left, mitre the bottom left hand and top right hand corners. For Ramana tiles, the length of the mitre will be equivalent to the end lap (150 mm) and the width equivalent to the side lap (80 mm).

(iii) All accessories are to be manufactured by Kenya Asbestos Cement Co and are to match the system of sheeting being used.

TIMBER SINGLE ROOFING

K.11 Roof coverings

Timber shingles shall be manufactured from red cedar or such other timber as specified, each shingle to be 405 mm long x 200 mm wide and tapering from 10mm down to 4mm in thickness. Split shingles must be stored in a weatherproof shed, off the ground and prior to fixing should be pre drilled and soaked in diesel oil or used engine oil three weeks prior to being used and drained for 24 hours and then fixed.

The shingles are to be nailed with 32 mm galvanised nails to 25 x 50 mm battons fixed to rafters at 125 mm gauge. The shingles shall be fixed with the thin edges uppermost to give a 125mm exposed length from the bottom edge. Side laps are to be 40 mm minimum.

Ridges shall be constructed of alternatively but jointed shingles fixed lengthwise along the ridge to give a 150 mm exposed length per shingle.

Eaves shall be constructed with a double eaves course laid breaking joint.

BITUMINOUS FELT ROOFING

K.12 The Contractor is required to arrange for the work to be executed complete and to the entire satisfaction of the Architect by an approved Sub-Contractor.

K.13 Guarantee

The Contractor obtain from the approved Sub-Contractor 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 Sub-Contractor 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.14 Samples

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

K.15 Preparation of Surfaces

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

K.16 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.17 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.

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

(iii) <u>One layer finish</u>

(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 25kgs per 10 S.M.
(c)	Jointing	One application of hot bituminous compound weighing not less than 30 kgs/per 10 S.M.

(iv) <u>Two layer finish</u>

(a)	Priming	Prime screed with P.F.4 primer
(b)	First layer (Class 1B)	One layer of heavy duty self finished felt weighing not less than 14 kgs per 10 S.M. laid loose on prepared screed.

<u>(iv) Two Layer finish</u>

(c)	Jointing Compound	One application of hot bituminous compound weighing not less than 30 kgs per 10 S.M.
(d)	Second Layer (Class 1C)	One layer of heavy duty self finished felt weighing not less than 25 kgs. per 10 S.M.

(iii) Three layer finish

(a) Priming — Prime screed with P.F.4 primer

(b) First Layer (Class 1B) — One layer of heavy duty self finished felt weighing not less than 14 kgs per 10 S.M. laid loose on prepared screed.

(c) Jointing Compound — One application of hot bituminous compound weighing not less than 30 kgs. per 10 S.M.

(d) Second (Class 1B) — One layer of heavy duty self finished felt weighing not less than 14 kgs. per 10 S.M.

(e) Jointing Compound — As described in (c) above.

(f) Third Layer (Class 1C) — One layer of heavy duty self finished felt weighing not less than 25 kgs. per 10 S.M.

(iv) Stone chipping finish. The entire surface to be mopped with hot bituminous compound and left overnight and followed with a layer of 6 – 12 mm white stone chippings bedded in mastic applied to the entire area and lightly rolled.

(v) Flashings, skirtings etc., are to be painted two coats bituminsed aluminum paint on completion.

K.18 Airpockets 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.19 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

K.25 **Materials generally**

All materials shall be as manufactured by Colas East AFRICA Limited.

K.26 **Preparation of surfaces**

All surfaces are to be dry, rough and finished to the requirements and to the entire satisfaction of the Sub-Contractor.

K.27 **Laying generally**

Laying shall be entirely in accordance with Colas East Africa Limited specifications.

K.28 **Air pockets and stains**

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

K.29 **Joints and fillets**

Joints in the work shall be carefully made and complete fusion obtained to make them water-tight. Fillets shall be run at all internal angles and in at least two operations. Perfectly water-tight joints shall be made around pipes through walls and floors and around gullies, etc.

K.30 **Outlets**

All outlets to be fixed 25mm below finished screed level.

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

K.31 **Test for falls**

presence of the Architect. Any defects or depressions shall be rectified and retested for approval.

K.20 **Protection**

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

COLAS BITUMINOUS ROOFING

K.21 **Approved firm**

All work shall be executed by a firm approved by the Architect in writing.

K.22 **Samples**

The Contractor shall, as and when required by the Architect, submit and deliver samples of any materials for testing.

K.23 **Statement as to screed and underbed**

The Contractor is to obtain from the Sub-Contractor a statement in writing to the effect that the screed and/or underbed is clean and otherwise satisfactory before the covering are laid. A copy of the statement is to be forwarded to the Architect.

K.24 **Guarantee**

The Contractor is to obtain from the approved Sub-Contractor 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 works, such Sub-Contractor shall, at his own expenses, make good to the satisfaction of the Architect all and any defects in the work which shall be attributable to improper materials or faulty workmanship, and shall bear the cost of any consequential damage as is provided for in such guarantee.

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.32 Protection

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

CARPENTRY AND JOINERY

LIST OF CLAUSE

M.28 Joinery Work
M.29 Softwood
M.30 Hardwoods
M.31 Plywood
M.32 Chipboard
M.33 Blockboard
M.34 Laminated Plastic Veneer
M.35 Fixing Doors and Frames
M.36 Construction of Doors
M.37 Fittings and Fixtures
M.38 Mouldings
M.39 Circular Work
M.40 Scribing
M.41 Finish
M.42 Completion of Works
M.43 Defective Work

IRONMONGERY

M.44 Generally

CARPENTRY AND JOINERY

M.1 **General**

All woodwork shall be carried out in accordance with the drawings and the principles of first class construction. Unless specifically stated otherwise, sizes shown on drawings are finished sizes and the Contractor must wrot faces.

MATERIALS

M.2 **Qualities of Timber**

a) The qualities of timber hereinafter are in accordance with the latest Kenya Government Grading Rules.

b) All timber described as Prime Grade is to be First Grade (Grade II).

c) All timber described as Selected Grade is to be Second Grade (Grade II).

d) All hardwood is to be Prime Grade (Grade II).

e) All timber for permanent work in the building shall before use be approved by the Architect for quality in accordance with the foregoing specification for its respective grade. Any timber not so approved by the Architect shall be removed from the site forthwith.

M.3 Insect Damage

All timber, whether graded or ungraded and including shuttering, scaffolding and the like shall be free of live borer, beetle or other insect attack when brought upon the site. The Contractor shall be responsible up to the end of the maintenance period for executing at his own cost all work necessary to eradicate insect attack of timber which becomes evident including the replacement of timbers attacked, notwithstanding that the timber concerned may have been inspected and passed as fit for use.

M.4 Seasoning of Timber

All carpentry timbers are to be seasoned to an average moisture consent of not more than 20%. All joinery timbers are to be seasoned to an average moisture content of not more than 15%. The Contractor is to make available on site a meter for testing moisture content of all timber delivered.

M.5 Preparation and Protection of Timber

i) All timber necessary for the works is to be purchased immediately the contract is signed, and when delivered is to be open-stacked for such further seasoning as may be further seasoning as may be necessary. Preparation of the timber is to be commenced simultaneously with the commencement of the works generally.

ii) All timber and assembled woodwork is to be protected from the weather and stored in such a way as to prevent attack by decay, fungi, termites or other insects.

M.6 Species of Timber

Only those timbers specified are to be used for the works, unless alternatives are authorized by the Architect in writing.

M.7 Pressure Impregnated Timber

i) All timber described as “Pressure impregnated” shall be impregnated under vacuum and pressure with “Celcure” or “Tanalith” wood preservative with an average absorption of not less than 6.7kgs. of dry salt per cubic metre. In case of resistant species where this retention cannot be obtained the timber shall be treated to refusal point. All treated timber shall not be exposed to wet conditions for at least 14 days after treatment has been carried out. All cut ends, drilling or fabrications on the site producing new surfaces shall be thoroughly brushed or soaked with “Celcure B” salts applied in accordance with the manufacturer’s instructions.

ii) Any other method of timber impregnation will only be allowed at the Architect’s approval.

M.8 Hardwood

All hardwood will comply with the requirements of B.S. 1186 Part 1 and B.S. 4047. It shall show a straight and regular grain throughout.

Hardwood shall be free from woolly texture, soft heart, sap wood, splits, shakes, all evidence of insect or fungi attack and rot and all faults caused by compression failure. There shall be no waney edges. Hardwood shall be free from knots on exposed faces. Any hardwood showing visible imperfections will be rejected.

Preservatives shall not be used without the Architect's permission where indicated on the drawings, internal hardwoods will be treated with clear sealants as specified elsewhere.

M.9 Softwood

Softwood timber for carcassing work shall be either Podocarpus or Cypress to the approval of the Architect and shall be to the dimensions specified on the drawing.

Timber shall be classified in accordance with the Groups listed in this Clause.

All softwood shall comply with the requirements of B.S. 1186 Part 1. Timber shall be free from woolly texture, soft heart, sap wood, splits, shakes. Pith showing on the surface, sopping grain exceeding one in eight checks, knots exceeding 25mm diameter, loose knot or knot holes and any evidence of insect of fungi attack. There shall be no waney edges.

Where indicated on the drawings, the softwood will be treated with clear sealer or painted with gloss paint.

All softwood is to be pressure impregnated against insect attack before delivery to site. Any ends cut after treatment shall be given two liberal coats or preservative.

M.10 Gumpoles

Gumpoles shall be the species eucalyptus sligna or eucalyptus shall be of the minimum diameters stated and shall be stripped of bark before incorporation in the works.

The Contractors attention is drawn to the lengths of the poles each of which must be in a single length: splicing will not be allowed.

M.11 Plywood

All plywood shall comply with the requirements of B.S. 1455 be obtained from a manufacturer to be approved by the Architect and be of the thickness shown on the drawings.

Plywood shall be Exterior Grade except where otherwise stated. Plies shall be bonded together with adhesives complying with the requirements of B.S.1203 Grade WBP.

Plywood shall be free from end joints (including joints in veneers) overlaps in core veneers, dead knots, patches and plugs, open defects, depressions due to defects in cure, insect attack (except isolated pinwork holes through face veneers only, fungal attack and from discolouration differing from that normally associated with species.

Face veneers shall be hard and durable and shall be capable of being finished to a smooth surface. Face vaneers shall closely match the general joinery timber supplied.

M.12 **Chipboard**

Chipboard shall be medium density wood particle board complying with B.S.2604 Part 2, produced in factories by an approved process.

M.13 **Blockboard**

Blockboard shall be of approved local or imported manufacture to B.S.3444 glued throughout and softwood or hardwood faced as hereinafter specified and equal to a sample to be deposited with the Architect for approval and which when approved shall form the standard for the works.

M.14 **Fibreboard**

Shall be insulating board to comply with B.S.1142 of the types specified and of approved manufacture.

M.15 **Tempered Hardboard**

To be of approved manufacture according in all respects with B.S.1142 suitable for painting, prepared and filed in accordance with the maker's instruction.

M.16 **Wood Block Floors**

i) To be supplied and laid in 460mm x 460 mm panels of a specialist all to the approval of the Architect.

ii) On completion and immediately prior to applying the clear finish, the surface is to be twice machine sanded using first coarse and then fine sandpaper and brushed perfectly clean.

M.17 **Timber Doors**

Doors are to be designed, manufactured and filed in accordance with the relevant British Standards summarized below:

B.S.	476	Part 8 1972	Fire tests etc
B.S.	4787	Part 1 1972	Door dimensions etc
B.S.	1186	Part 1 1971	Quality of timber and Workmanship
B.S.	1227	Part 1 A	Hinges
B.S.	3827		Builder's hardware –glossary

M.18 **Flush Doors**

Generally, the requirement for flush doors is that they have a minimum thickness of 40 mm. They shall be faced both sides and there will be hardwood lippings to all edges. Hollow core and semi-solid types shall contain adequate within the core for ironmongery (e.g. lock blocks etc).

All hollow and semi-solid doors shall be faced with WEP bonded Exterior grade plywood.

Except where indicated, doors shall have hardwood veneered faces.

Vision panels where required shall be 150 mm wide x 900 mm deep.

Flush doors shall be obtained from a supplier to be approved by the Architect. Flush doors shall comply with the requirements of B.S. 459 part 1, 2 and 3. All edges shall be lipped with hardwood tongued into the edge of the door.

The core of solid core flush doors shall be constructed of longitudinal laminations of precision planed timber, butt jointed and glued with resin based adhesive under hydraulic pressure, the whole forming a rigid fire-resistant raft.

Where doors are indicated as fire resistant they shall be constructed so as to exceed the requirements stated when tested in accordance with B.S. 476 Part 8 (1972) Section 7.

M.19 Hardwood Vaneers

a) Veneer facings shall be selected to the approval of the Architect.

b) No glass or synthetic fibre stitching will be permitted for jointing veneer leaves together.

c) Veneers shall be free from splits, dots, glue, stains, insect or fungi attack and rot.

d) Filling or inlaying of any kind will not be accepted.

e) All wood veneers shall be bonded to the core material in such a way that no lifting and blistering shall occur.

M.20 Laminated Plastic Veneers

Laminated plastic veneers shall be a decorative sheet 1.6 mm thick complying with B..S. 3794 Class 1. The pattern will be selected by the Architect. The

laminate shall have decorative pattern finish on one face only. Patterns will be selected from the manufacturer's standard range.

M.21 **Miscellaneous Materials**

a) Tapered timber bellets for filling screw holes must be cut across the grain and shall be of the colour and grain being plugged.

b) Metal fixing devices must be fully rust-proofed. Cramps, brackets, plugs, bolts etc., must be of a type make and pattern approved by the Architect.

c) Adhesives must be suitable for use in the local conditions and be compatible with the materials with which they are in contact.

M.22 **Nails and Screws**

Nails shall comply with B.S. 1201, screws shall comply with B.S.1494 and bolts shall comply with B.S.916.

WORKMANSHIP

M.23 **Tolerances**

The method of construction must accommodate tolerances as shown on the drawings and allow for ensuring that repetitive units can be accurately located in relation to grid lines and that tolerances do not accumulate.

Reasonable tolerance shall be provided at all junctions between joinery and the building carcass, whether of masonry or frame construction, so that any irregularities or movement may be adequately compensated.

M.24 **Jointing**

a) All joints must be made as specified or detailed and the execution of all jointing shall be to the satisfaction of the Architect.

b) Joining surfaces of all connections exposed to the weather are to be thickly primed except where giving is specified. Surfaces are to be in good contact over the whole area of the joint before fastenings re applied.

c) No nails, screws or bolts are to be placed in any end split. If splitting is likely or is encountered in the course of the work, holes for nails are to be pre-bored at diameters not exceeding 4/5 of the diameter of the nails. Clenched nails must be bent at right angles to the grain. Lead holes are to be bored for all screws.

d) Where the use of bolts and washers is specified the holes are to be bored from both sides of the timber and to be a diameter D + D/16 where D is the diameter of the bolt. Nuts must be brought up tight but care is to be taken to avoid crushing of the timber under the washers.

e) Joints in joinery must be as specified or detailed and so designed and secured as to resist or compensate for any stresses to which they may be subjected. All nails, springs etc., are to be punched and puttied.

f) Loose joints are to be made where provision must be made for shrinkage, glued joints where shrinkage need not be considered and where sealed joints are required. All glued joints shall be cross-tongued or otherwise reinforced.

g) Glues for load bearing joints or where conditions may be damp must be of the resin type. For non-load bearing joints, or where dry conditions can be guaranteed, resin or organic glues may be used.

M.25 Frame Work

The word “framed” shall mean and include all the best known methods of jointing woodwork together by mortice, tenon, dovetail or other methods and for forming all necessary stops, mitres or mason’s mitres in members which are moulded, rebated etc.

M.26 Plugging

Plugging and fixing to walls in all trades shall be executed by “Rawlplugging” or similar approved proprietary methods all in accordance with the manufacturer’s printed instructions. Hacking of holes and filling with timber plugs will not be permitted under any circumstances.

M.27 Carpentry Work

a) All carpentry shall be executed with workmanship of the best quality. Scantlings and boards shall be accurately sawn and shall be uniform in width and thickness throughout and shall be as long as possible and practicable in order to eliminate joints.

b) All work shall be left with a sawn surface except where specified to be wrot.

c) All work shall be accurately set out and in strict accordance with the drawings and shall be framed together and securely fixed in the best possible manner with properly made joints. Provide all braids, nails, screws etc., s necessary and as directed and approved.

d) Actual dimensions of scantlings for carpentry shall not vary from the specified dimensions by more than +3mm or -1mm. Sizes and thickness of wrot carpentry timbers are nominal, that is to say a variation of 3mm from the specified sizes will be allowed from each wrot surface unless the thickness or size is described as “finished” in which case no variation from the stated thickness or size will be permitted.

M.8 Joinery work

All joinery work shall be wrot unless otherwise described.

a) Sizes and thickness of joinery are nominal that is to say a variation of 3mm from the specified sizes will be allowed from each wrot surface unless the thickness or size is described as “finished” in which case no variation from the stated thickness or size will be permitted.

b) No joinery to be put in hand until the details have been supplied or approved by the Architect and in all cases the details are to be worked to.

c) All joinery shall be executed with workmanship of the best quality in strict accordance with the detailed drawings, mouldings shall be accurately and truly run on the solid and all work planed, sand-papered and finished to the approval of the Architect. All arises to be slightly rounded. All framed work shall be cut out, and framed together as soon after the commencement of the building is ready for fixing the same and any portions that warp, get in winding, develop shakes or other defects shall be replaced with new. In door frames etc., the heart face of the timber shall be fixed away from the wall. As soon as required for fixing in the building the framing shall be glued together with glue as described and properly wedged or pinned etc., as directed.

d) All beads, fillets and small members shall be filed with round oroval braids or nails well punched in and stopped. All larger members shall be fixed with screws, the screws let in and pelleted over with wood bellets to match the grain.

e) Cups and screws for fixing beads and fillets shall be spaced 150 mm and 25 mm iron angles.

f) All joinery immediately upon delivery to the site is to be stored and protected from the weather.

g) All joinery is to be primed before fixing but no work is to be primed until it has been approved by the Architect.

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

i) When natural finish is specified, the timber in adjacent pieces shall be matched and uniform or symmetrical in colour and grain.

M.29 **Softwood**

Fixing shall be by means of non-rusting screws with countersunk heads to proprietary plugs or grounds. Nailing will not be permitted.

Sections shall be neatly and accurately cut so as to avoid splitting of the wood.

M.30 **Hardwood**

Hardwoods are as described.

In jointed panels each piece shall be of the same species.

Joinery for oiling shall have all surfaces of the same species and same character or grain.

Fixing shall be by means of brass brass screws with countersunk heads to proprietary plugs or grounds. Where work is face screwed, heads of screws shall finish not less than 6mm below the surface and be covered with round teak pellets of appropriate thickness. Pellets shall be chosen and fixed so as to match colour and pattern of grain so far as is practical. Nailing will not be permitted. Sections shall be neatly and accurately cut with fine toothed saws.

M.31 **Plywood**

Plywood of the required thickness shall be used. The Contractor will not be allowed to make up thickness by glueing together sheets of thinner plywood.

Where cutting is required it shall be neatly and accurately performed with fine toothed saws so as to avoid splitting the face veneers and intermediate plies.

M.32 **Chipboard**

When cutting is necessary, it shall be neatly and accurately performed with fine toothed saws so as to avoid splitting the face veneers. Where raw edges arise

from cutting these shall be faced with a matching hardwood fillet cut pinned and glued to match factory produced edges.

M.34 Laminated Plastic Veneer

Laminated plastic veneers are to be fixed with an approved adhesive. Care being taken to eliminate all air from beneath the laminate on fixing. The laminate is to be free from chipped or cracked portions and work so disfigured is to be removed and replaced. When the adhesive is set, the laminate is to be neatly leveled off along all arises with a plane.

Where plastic laminate is fixed to doors or shelves etc., without a laminate to the outer edge, a raised lipping is to be provided and the laminate finished flush against the lipping.

M.35 Fixing Doors and Frames

Doors shall be properly fitted to give a uniform clearance of not more than 3mm all round and hinges shall be let into doors.

Door frames shall be properly framed at angles. Door stops shall be housed into grooves in frames. Architraves shall be provided to conceal finishes. Frames shall be fixed to grounds or plugs. Fixing shall be by means of non-rusting screws with countersunk heads. For hardwood frames screw heads shall be finished not less than 6mm below surface of the wood and shall be covered with matching round hardwood pellets of appropriate thickness. Pellets shall be chosen and fixed so as to match colour and pattern of grain so far as is practical. Nailing will not be permitted.

Except where indicated doors shall be kept clean for clear polyurethane varnish.

Door frames shall be treated to match doors.

Glazing shall be wired glass 6 mm thick with edges wrapped in washleather and secured with hardwood glazing beads size 10mm x 15 mm mitred at angles secured with brass screws and cubs.

M.36 Construction of Doors

a) Flush doors specified as solid construction shall have a 100% solid core of vertical laminated Cedar of equal and approved.

b) Flush doors specified as semi-solid construction shall be constructed with timber stiles and rails, infilled with horizontal intermediate rails spaced equally apart and tenoned into the stiles.

c) Unless otherwise specified, doors scheduled to receive a clear or veneered finish shall be lipped on all edges.

d) Where panels over doors are specified, such panels shall be constructed in the same way and with the same materials as the doors above which they are situated and the panels shall match the doors in every respect.

e) For doors specified as plywood faced, the plywood shall not be less than 3mm thick, complying with the requirements of B.S. 1455. WBP type. Face veneers shall be Grade 1 for painted doors.

f) All doors shall be provided with lock blocks of a minimum size 300 mm x 75 mm.

g) Glass beading strips shall be provided was leather self adhesive tape turned up over both sides of the glass and glazing surfaces and turned up over both sides of the glass and glazing surfaces and turned to the straight line.

h) All screws shall be countersunk and screwed and pelleted in un-painted work.

i) Timber pellets shall be glued and tapped into the hole, making sure the grains line up and carefully trimmed back flush with joinery to give a clear, smooth overall surface.

M.37 **Fittings and Fixtures**

The fittings, etc., are to be accurately constructed in accordance with the detailed drawings. The doors, drawers, etc., are all to fit and open and close smoothly and all work next to walls, floors and ceilings is to be soundly fixed and scribed to fit snugly against same.

M.38 **Mouldings**

Moulded work shall be accurately worked to the full size details supplied by the Architect. Moldings shall be worked the solid unless otherwise stated.

M.39 **Circular Work**

When circular work is specified is shall be built up with an appropriate number of pieces cut to the required shapes. The pieces shall be put together in two (or three) thickness so that they break joint, and shall be secured with hardwood keys and wedges or with hardwood pins (whichever is more appropriate).

M.40 **Scribing**

Skirting, architraves, plates and other joinery works shall be accurately scribed to fit the contour of any irregular surface against which they will be required from a close butt connection.

M.41 **Finish**

All joinery which is to be oiled and painted shall be finished smooth and cleaned by rubbing down by hand with fine glassbar.

M.42 **Completion of Works**

Protection of all joinery and ironmonger must be maintained until completion of the contract as a whole.

All joinery and glass is to be thoroughly cleaned before the building is handed over.

M.43 **Defective Work**

All work judged to be defective must be removed and replaced as directed by the Architect.

IRONMONGERY

M.44 **Generally**

a) Ironmongery shall be fixed with suitable screws to match and prices shall include for this.

b) All locks and ironmongery shall be fixed before the woodwork is painted, handles shall be removed before the painting commences, carefully stored and refixed after completion of painting.

c) All locks, springs and other items of ironmongery with movable parts shall be properly tested, cleaned and adjusted where necessary to ensure proper working order by the Contractor.

e) The keys of all locks shall have labels attached with door references marked on before handing to the Architect.

f) All locks shall be provided with a master key system and prices shall include for this as required by the Client and as instructed by the Architect. The client's requirements are to be obtained by the Contractor before ordering.

LIST OF CLAUSES

STRUCTURAL STEEL-WORK

N.1 Approved Sub-Contractor

The whole of the structural steelwork is to be executed by a specialist Sub-Contractor who is to be specifically approved by the Engineer and the Contractor will be required to make arrangements for the execution of this work and bear all expenses incurred.

N.2 Quality of Material and Workmanship

The Quality of all materials and workmanship used in the execution of the works shall comply with the requirements of current relevant British Standard and Codes of Practice, including all the latest amendments.

N.3 British Standards and Codes of Practice

B.S. 4360 Weldable Structural Steels

B.S. 449 The use of Structural Steel in Building.
(incorporating B.S. code of Practice B.P.113 including Addendum No.1)

B.S.4 (Part 1) Hot Rolled Sections

B.S.4 (Part 2) Hot rolled Hollow Sections

B.S.2994 & 1449 Cold Formed Steel Sections

B.S. 938 General requirements for the Metal Arc
(Welding of Structural Steel Tubes to B.S. 1775. (B.S.938 will be considered to apply to the requirements for welding of hot rolled hollow sections to B.S. 4 Part 2).

B.S.1775 Steel Tubes for Mechanical, Structural & General Engineering Purposes.

B.S. 1856 General requirements for the Metal Arc Welding of Mild Steel

B.S. 639 Covered Electrodes for the Metal Arc Welding of Mild Steel

C.P.2008 Protection of Iron & Steel Structures From Corrosion.

N.6 Test

The Engineer may at any time require any materials to be tested in accordance with the requirements of the Standards listed above. The cost of all successful tests shall be borne by the Employer. The Contractor shall, if required by the Engineer, promptly supply at his own expense test pieces. The costs of tests of tests on materials failing to comply with these Standards shall be borne by the Contractor. If in the opinion of the Engineer, the Contractor may be directed to dismantle and cut out the parts concerned and remove them for examination and testing. The cost of dismantling, cutting out and making good to the approval of the Engineer shall be borne by the Contractor.

N.7 Fabrication

The standard of work and the general procedure to be followed during fabrication shall be in accordance with B.S. 449. The Contractor must ascertain all dimensions on the site prior to commencement of fabrication.

a) Cutting & Bending – All members, plates, brackets, etc., shall be neatly and accurately sneered, sawn or profiled to the required shape as shown on the drawings. Where steel is oxy-cut to shape. Care shall be taken to preserve the full finished sizes required.

If members or plates are bent or set, the bends or sets shall be correctly made to the radii or angles specified without leaving hammer marks. The materials may be heated to permit this. Material that has been heated should be annealed to approval.

b) Punching & Drilling – Holes for black bolts shall be drilled or punched 2mm larger in diameter than the bolt size. Holes for high tensile friction grip bolts shall be drilled or sub-punched and reamed to 2mm larger in diameter than the specified bolt size. All drilled holes shall be parallel sides and shall be drilled with the axle of the holes perpendicular to the surfaces. Badly drilled holes shall either be reamed out to approval and larger bolts fitted or otherwise as directed. All rough arises shall be ground off. Holes for bolts in material thicker than 15mm must be drilled. When holes are drilled in one operation through two or more thicknesses of material, the parts shall be separated after drilling and all burrs removed before a gas cutting process. Holes formed or enlarged by oxy-cutting will not be accepted and must be filled to approval by electric welding and redrilling.

c) Bolting – All bolts used shall be of such length that at least one full thread is exposed beyond the nut after the nut has been tightened. Where a nut or bolt head would bear on an inclined surface, a belleved washer of the correct shape shall be interposed between the two surfaces. Bevelled washers shall not be allowed to get out of position during fabrication and erection and for this purpose may be spot welded to the steel surface.

Bevelled washers for use with high tensiles bolts shall not as welded.

i) Black Bolts, Nuts and Washers

Black bolts shall comply with the requirements of B.S. 916 (B.S.W. Threads) or B.S. 2708 (u.n.c. Threads) as appropriate.

ii) Close Tolerance Bolts

Close tolerance bolts shall conform to B.S. 1768

iii) High Tensils Bolts

High tensils bolts shall conform to B.S.1768

iv) High Strength Friction Grip Bolts

a) General grade bolts to B.S. 3139 Part 1

b) Load indicating bolts manufactured by G.K.M. Ltd or any other approved manufactuer.

c) High tensils bolts to B.S. 1768.

v) Rawbolts shall be those manufactured by Rawlolug Company Ltd. or any other approved manufacturer.

v) Washers

Plain and tapered washers to B.S. 3410.

Spring washers to B.S. 1802.

Washers for high strength friction grip bolts shall be appropriate with B.S. 4360 and in the case of high tensile steel rivets shall be so manufactured that they can be driven and the heads formed and the physical properties not impaired.

d) Pressed Steel Sections

Pressed or cold rolled steel burning and girders shall be to the sizes indicated on the drawings and shall be formed from accorded steel strip with a minimum yield strength of 175N/mm

The sections shall be manufactured straight and free from twist. The tolerance away from straightness shall not be greater than 3mm for every 2000mm in length along an folded edge.

e) Electrical Welding

All welding shall be carried out in strict accordance with the requirements of B.S.1856 and B.S. 2624 as appropriate and electrodes shall comply with B.S. 639.

Fusion faces shall be free from irregularities such as tears, fins, etc., which would interfere with the deposition of weld metal.

Fusion faces shall be smooth and uniform and shall be free from loose scale, slag, rust, grease, paint and other deleterious materials.

All welds shall be of approved type and finished size as specified. Welding shall be carried out in such sequence that minimum distortion of the parts welded results.

Preparation of edges for welding shall be carried out by planing or machine flame cutting. Manual flame cutting will not be permitted.

Parts to be welded shall be carried out with each run closely following the previous run out allowing sufficient time for the proper removal of slag.

The Contractor shall ensure that each run is inspected and any unsatisfactory weld cut and remade to approval.

Welds in material 25mm or greater in thickness shall be made by the Argon arc or similar approved process and special precautions shall be taken to prevent weld cracking.

Unless otherwise specified, the minimum size of fillet shall be 6mm.

On completion, welds shall present a smooth and regular finish. Weld metal shall be solid throughout with complete fusion between weld metal and parent metal and between successive runs throughout the joint.

Defects shall be cut out and made good to approval in sound weld metal.

The external faces of butt welds are to be ground smooth on completion to the approval of the Engineer.

N.7 Shop and Field Connections

a) **Rolled Sections**

All shop connections shall be electric welded or bolted with high tensile bolts.

No bolts used shall be less that 12 mm diameter and no weld less than 40 mm in length. At least two bolts shall be used in connections transmitting loads unless otherwise indicated by the Engineer.

No weld of length less than four times the nominal fillet size shall be deemed capable of carrying load.

Beam to column connections shall be as detailed i.e., bolted with high tensile or black bolts in drilled holes. Black bolts in punched holes will only be permitted for connections carrying a designed load or for connections to timber members.

b) **Structural Hollow Sections**

Hollow sections shall be connected by electrical welding unless specified otherwise.

The designs of welds shall be in accordance with Clauses 53 and 54 and Appendix C of B.S.449.

Butt welds in tension members will not be permitted unless the prior approval of the Engineer in writing has first been obtained.

Butt welds where permitted, shall be made with the fusion surfaces of the ends of each member properly prepared and the member properly aligned.

N.8 Assembly

a) **Trusses and Portal Frames**

Trusses and portal frames shall be carefully set out to the dimensions shown on the drawings.

Where it is required that trusses be campered, such camper shall be provided by bending the bottom chord to an arc of a circle.

Not withstanding any dimensioned spacing of purlin cleats, the Contractor shall ensure that purlin cleat spacing is satisfactory for the available stock lengths of roof sheeting. However, the Engineer's approval must frst be obtained before an alteration is made in purlin spacing or sheeting sizes.

Splices in portal and other frames shall be made where shown on the details or where directed by the Engineer.

b) **Boxed Members**

Abutting edges of boxed members shall be connected and sealed with a continuous weld to exclude the entrance of moisture. Where specified such welds shall be ground flush to approval.

c) **Shop Assembly**

Assembly of units in the shop prior to transporting to the site must be inspected by the Engineer before painting. The assembled work shall be laid out in the shop pr yard such that all parts are accessible for inspection and testing.

The Contractor shall furnish all facilities for inspection and testing of the works and must notify the Engineer on every occasion materials are ready for inspection.

d) **Marking**

All embers of the structures to be site assembled shall be marked in accordance with the shop details and marking plans submitted to the Engineer for approval.

N.9 Erection

a) **Site Dimensions**

Erection shall not commence unless and until accurate site dimensions have been taken by the Contractor. No claims will be considered should site dimensions differ from those on the drawings. Any modifications to the structural steel required in order to comply with site dimensions shall be made on the ground to the Engineer's approval before erection is commenced.

b) Safety

All erection shall be carried out by competent and experienced personnel and the Contractor shall take every care to safeguard members of the public, workmen and adjoining property against injury and/or damage. The Contractor shall be held responsible for all damage caused to the structure, workmen or other property during erection.

All gear used shall be of adequate strength and shall comply with all current regulations.

During erection the work shall at all times be adequately bolted, guyed and/or braced to make the structure secure.

b) Storage and Handling

Steel members shall be stored, handled and erected in such a manner that no member shall be subjected to excessive stresses which could have adverse effect on the propertied of the steel. If, in the opinion of the Engineer, the steelwork has been subjected to such treatment. The Contractor shall remove the member from the site and replace it at his own expense.

c) Storage and Handling

Steel members shall be stored, handled and erected in such a manner that no member shall be subjected to excessive stresses which could have adverse effect on the properties of the steel. If, in the opinion of the Engineer, the steelwork has been subjected to such treatment. The Contractor shall remove the member from the site and replace it at his own expense.

d) Erection Notes

No member or part of a member which has been bent or destroyed shall be erected in that condition. All straightening shall be done on the ground.

Stanchions shall be wedged to line and level on steel or cast iron wedges and checked by the Engineer. After acceptance, stanchion bases shall be grouted to approval before wedges are removed. Unless otherwise shown on the drawings, all are removed. Unless otherwise shown on the drawings, all stanchions shall be left truly vertical and correct to line and level. Beams, girders, etc shall be erected level unless otherwise shown, and correctly positioned.

Trusses and open web joists shall be carefully handled at all times and during erection shall be lifted at such points and in such a manner as will preclude any possibility of damage from excessive stresses.

Packing plates, shims, washers or similar adjusting pieces found necessary to accommodate tolerance in structural site dimensions shall be provided and fixed to the approval of the Engineer.

Immediately after erection, each truss shall be made secure by purlins, bracing or guys to approval of the Engineer. Bracing shall be fixed in position as soon as dependent portion of the work is completed.

a) **Tightening and Testing High Tensile Friction Grip Bolt**

Before assembly, the contact surfaces, including those adjacent to the washers, shall be descaled and be free from dirt, oil, loose scale, purrs, paint (except priming paint), pits and other defects that would prevent proper seating of the parts.

Bolts shall be fixed with approved hardened flat or capered washers as required between the bolt and nut and the softer mild steel.

When bearing faces of the bolted parts have a slope of more than 1 in 20 with respect to a plane normal to the bolt axis, square smooth

bevelled washers shall be used to compensate for the lack of parallelism.

All bolts shall be tightened by the Turn of Nut method. This method shall be generally be as specified in B.S. 3259 and as approved by the Engineer to achieve in all bolts a minimum tension equal to the proof load.

g) **Grouting**

Unless otherwise detailed on the drawing, a space of not less than 40 mm shall be provided between undersides of column base plates and footings, and between all beams and roof truss bearings and concrete pads.

After each column, beam or roof truss has been wedged up to a line and level and fixed in position to approval, the space between footing or pad and the underside of the column base plate or steel member shall be grouted with a mixture of one part of Portland Cement and one part of approved washed sand (1:1).

The Portland Cement and sand shall be thoroughly mixed together with sufficient water to produce a mixture of damp earth consistency and shall be used within twenty minutes of mixing. The caulking mixture shall be packed tight into the space between base plate and foundation and protected from damage until it sets.

N.10 Painting

a) **Paints**

All paints are to be obtained from suppliers approved in writing by the Engineer.

Paints are to be delivered to the site or to the Contractor's fabrication site in the original containers as supplied by the manufacture with seals unbroken and are to be used in strict accordance with the manufacturer's instructions.

Manufacturer's representatives are to be free to visit the site and inspect materials for laboratory analysis.

Paints are not to be thinned unless instructed by the Engineer. No external painting is to be carried out during rain or when rain is likely to occur before the paint has had time to dry. All surfaces are to be dry and free from moisture during painting.

b) **Preparation for Painting**

All structural steel shall be thoroughly scraped and wire brushed to remove mill scale and rust. Dirt, grease and oil shall be washed off with white spirit and the steel allowed to dry.

c) **Application**

A first coat of Red Lead Graphite Primer or other approved primer shall be applied after fabrication of the works has been completed. A minimum of 24 hours shall elapse before the steel is moved from its position after painting has been completed.

After delivery to site, the steel shall be carefully examined and all areas where the priming coat has been damaged and/or where rust has developed shall be washed with white spirit and wire brushed as necessary and a further priming coat as for the first coat applied to completely cover the damaged area.

During erection, surfaces of steel which are to be in contact shall be painted with one further coat of primer of primer as previously described and the surfaces brought together whilst the paint is still wet.

After erection, paint a second and finishing coatis Oil Company Aluminum Paint 368/36 or other finishing paint of standard as for steelwork. Welds shall not be painted over until they have been deslagged, inspected and approved.

Steel purlins and side rails shall generally be painted as for steelwork when the following specification shall be used.

1st Coat - Red Oxide Zinc Chormate Primer of other

2nd Coat - Robbialac Oil Company Aluminium Paint 368/36 or other equal and approved Aluminum Paint.

The interior of mild steel gutters shall be prepared as previously described and painted with 2 coats of Robbialac Epilac Coal Tar Epoxy Paint or other approved paint.

METALWORK

LIST OF CLAUSES

MATERIALS

WORKMANSHIP

METALWORK

MATERIALS

P.1 Generally

All materials shall be the best of their respective kinds free from defects and all work is to be carried out in the most workmanlike manner and strictly as directed by the Architect. The materials in all stages of transportation, handling and stacking shall be kept clean and prevented from injury by breaking, bending or distortion and weather action.

P.2 Mild Steel

Mild steel shall comply with B.S. 15.

P.3 Hollow Section Tubing

Square and rectangular hollow section tubing shall be hot rolled mild steel in accordance with Grade 43C of B.S.4360.

P.4 Bolts, Nuts and Washers

These shall be fabricated from materials which comply with B.S.15 and each manufactured item shall comply with the appropriate B.S.

P.5 Galvanized Sheet Steel

To be No.24 S.W.G. of approved manufacture to B.S. 2989 of quality mild steel sheets cold rolled close annealed patent flattened and hot dip galvanized.

P.6 Aluminium

Aluminium shall be extruded sections with an anodized finish, either natural or coloured to give a 25 micron minimum depth to European norm EWAA.

The Contractor shall submit with each item or batch of items delivered, test certificates or such other documentary evidence as the Architect shall require that the depth anodizing specified has been achieved.

P.7 Stainless Steel

Stainless steel tube shall be Austenic steel B.S. comparable to B.S. 1449 Type 316 S 16\

P.8 **Metal Door Frames**

Metal door frames are to be in steel to comply with B.S. 1245 of profile to suit the wall thickness.

Door frames are to be provided with the following:-

a) Two priming coats of paint

b) Fixing lugs for building into walls

c) Three galvanized steel hinges per door

d) Adjustable lock strike plate

e) Two shock absorber buffers

P.9 **Steel Windows**

Steel Windows shall be manufactured from section confirming with B.S.990 of heavy duty sections of the metric W20 range of approved manufacture and design approved by the Architect.

After manufacture and before delivery to site steel windows are to be hot galvanized by dipping in a bath of molten zinc or painted with one coat primer.

P.10 **Aluminium Windows**

Aluminium windows are to be designed, manufactured and fixed in accordance with the relevant British Standards summarized below:-

B.S. DD4 - Grading of Windows

B.S. 1470 - Wrought aluminium and aluminium alloys

B.S.1474 - Wrought aluminium and aluminium alloys

B.S. 4315 - (Part I) window and structural gasket-glazing Systems

B.S.4873	-	Aluminium alloy to windows
CP 3CH.V	-	Loading
CP 153	-	Code for windows

Alternative standards may be adhered to but the Contractor must demonstrate that they are of an equal or better standard than the standards referred to in this specification.

Members for aluminium windows shall be extruded aluminium and shall be fabricated from designated treated alloy HE9 TF, HE9 TE or HE 9 TB to B.S. 1474. Ancillary members such as sills and coupling mullions formed from sheet materials shall be fabricated from designated alloys SIC NS3 or NS4 in an appropriate temper. Alternative alloys meeting the required physical properties of this specification shall be acceptable.

The main wet of aluminium solid section outer frame shall be not less than 1.2mm thick at minimum tolerance.

For information on bi-metallic contacts see CP 153 appendix A.

The overall sizes of an assembled window frame shall be maintained within a permissible deviation of 1.5mm. Maximum difference in length of frame diagonals shall be 4 mm. Horizontally, the 1800 mm grid shall be used to centre the mullions and vertically allowance must be made for a large setting tolerance at the window head.

Fasteners to be designed so they cannot be released from the outside by the insertion of a thin blade or similar tool.

No opening light shall be openable or removable from the outside when it is fastened in the closed position except by use of special tools or break of part of the window.

Replacement of weather stripping shall be possible from within the building and without requiring removal of the main frame.

WORKMANSHIP

P.11 Welding

All welding is to be in accordance with the requirements of B.S.1856 and 938 and the electrodes shall comply with b.s. 639.

Fusion faces shall be free from irregularities which could interfere with the welding material. These faces shall also be free from any deleterious material such as rust, grease and paint.

All welds shall be of the specified finished sizes and the sequence of the welding shall be carried out in a manner that will give minimum distortion to the welded parts.

Edges of all welding parts will be maintained in their correct position.

Welds shall be carried out with each run closely following the one prior with sufficient time between to allow for removal of slag.

Each run of weld is to be inspected and the sub-contractor shall ensure that unsatisfactory welds are cut out or remade to the required standard.

The minimum size of filled weld shall be 6mm.

All completed welds shall have a regular and smooth surface. The weld material shall be solid with complete fusion throughout the weld and to the faircut metals.

Any defects shall be cut out or made good to approval.

External faces of butt welds to be ground smooth.

P.12 Painting

All steel is to be wire brushed and any loose scale, dirt or grease shall be removed before any painting is commenced. One coat of red oxide primer type A to B.S. 2523 shall be applied at the shop.

Any damage to the printing paint shall be made good to the Architect's satisfaction.

P.13 Fixing of Steel Windows

Fixing of metal windows shall include for assembling and fixing, including screwing to sub-frames or cutting mortices for lugs in concrete or walling and running with cement mortar 91:4), bedding frames in similar mortar, pointing in mastic, bedding sills, transoms and mullions in mastic, making good finishings around both sides and fixing, oiling and adjusting all fittings and frames.

P.14 Aluminim Windows

Adjacent sashes in horizontal sliding windows shall be separated by a compatible spacer and the sashes shall be supported on bearing devices that facilitate movement.

Joints in frames shall be made either by welding or by mechanical means. Where necessary joints shall be sealed with flexible material. Joints to be flush joints within one of the tolerances given in B.S. 1474.

Hardware including its fixings shall be compatible with aluminium and shall be replaceable without the outer frame from its surround.

All screws, nuts, bolts, rivets, washers and other fastenings shall be of stainless steel or aluminium with the exception of those which are protected when the window is closed. Alternatively these may be made of steel which has been finished by one of the following methods:-

a) Zinc plated and passivated according to B.S.11706 Classification Nr.Zn3.

b) Hot – dip galvanized according to the requirements of B.S. 729

c) Sherardized according to the requirements of B.S. 729 Part 2 or

d) Sprayed with metal coating according to B.S. 2569 Part 1.

Fixing devices not of aluminium may be of steel finished by either method (a), (b), or (d) above.

The fixings shall be capable of withstanding the design wind icad and any operating forces on the window.

Windows manufactured to standards set out in this specification shall each bear the name or trademark of the manufacturer and the number of the appropriate standard.

Fixing, assembling, bedding frames and painting shall be executed as described for fixing of Steel Windows.

FLOOR, WALL AND CEILING

LIST OF CLAUSES

PLASTERWORK

BEDS AND BACKINGS

OTHER INSITU FINISHINGS

S.26 Granolithic paving and wall finishings
S.27 Insitu terrazzo paving and wall finishings
S.29 Division strips
S.30 Washed terrazzo wall finishings
S.31 Tyolean finish

TILE, SLAB AND BLOCK FINISHINGS

S.31 Mortar for bedding and pointing
S.32 Preparation of surfaces
S.33 Glazed ceramic wall tiles
S.34 Cement interlocking tiles
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S.36 Ceramic tile pavings and accessories
S.37 Granolithic and terrazzo tile pavings
S.38 Vinyl asbestos tiles
S.39 Wood Block flooring

PLAIN SHEET FINISHINGS

S.40 Generally

FLOOR, WALL AND CEILING FINISHINGS

PLASTERWORK

S.1 **Generally**

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

Plaster shall consist of an undercoat of 1 part cement to 6 parts sand by volume, and a finishing coat of 1 part cement to 10 parts lime putty. Each coat shall be finished to the thickness specified.

S.2 Cement

Ordinary Portland cement and shall comply with K.S. 02-21. 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, Part 2.

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.4 Sands

Sands for cement and lime mixes shall comply with B.S. 1199, Table 1.

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.5 Water

Water shall be clean and kept free from all impurities.

S.6 Storage of materials

All plasters, lime and cement shall be stored in a properly roofed, weather-proof, dry, well ventilated shed, used exclusively for this purpose, with a wood floor not less than 150 mm clear above the earth.

All sands shall be stored separately, according to type, on clean dry hard standings 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.

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 traces of mould oil shall be removed from concrete surfaces by scrubbing with water containing detergent and rinsing with fresh water.

Concrete surfaces shall be well hacked to provide an adequate key.

Surfaces shall be wetted and re-wetted as required to equalise 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 10mm in thickness in one particular application.

S.10 Mixing of materials

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

Bankers and gauge boxes shall be thoroughly cleaned after each mix 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 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 nest 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 or wood float as described.

S.13 **Junctions of walls 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 **Arises**

All arises shall be pencil rounded unless otherwise specified.

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.

S.16 **Light weight roof screeds**

Light weight roof screeds shall consist of one part cement to six parts vermiculite aggregate, laid to falls as necessary and finished with 12mm cement and sand (1:4) screed finished to receive roofing.

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

Light weight roof screeds shall be cured properly for 7 days and shall be thoroughly and completely dry before any finishings are applied.

S.17 **Cement and sand proportions**

A mix referred to as (1:4) shall mean 1 cubic metre of cement to 4 cubic metres of sand and other mixes shall be construed accordingly.

S.18 **Preparation of surfaces**

Walls shall be prepared as described for “plasterwork”. Concrete floors or roofs to receive screeds or pavings shall be hacked 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 pavings 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 backing 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 **Surfaces of beds and backings**

Screeded beds for insitu finishings of floor finishings bedded in mortar, shall be left rough from the screeding board.

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

Trowelled beds for flexible finishings shall be finished smooth and free from score marks, grooves or depressions.

Screeded backings for insitu wall finishings or wall finishings bedded in mortar shall be scratched for key.

Floated backings for inflexible wall finishings fixed with adhesive shall be left with a plain surface.

Trowelled backings for flexible wall finishings shall be finished smooth and free from score marks or depressions.

Beds and Backings for finishings by specialists shall be to the approval of the specialist.

Other insitu finishings

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 Waterproofers

Waterproofers shall be “Sealocrete Double Strength Premix” or other approved integral waterproofer, used in accordance with the manufacturers instructions.

S.23 Integral Hardeners

Integral hardeners shall be “Febspeed Plus” or other approved used in accordance with the manufacturers instructions.

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

S.26 Granolithic paving and wall finishes

The thickness of the pavings, etc., in these Bills of Quantities include for the combined screed or backing and the granolithic finish but in any case these are to be laid integrally.

Pavings to be 30mm minimum thickness granolithic laid on a screed to make up full thickness specified. The screed is to be cement and sand (1:3).

Dadoes to be 10mm minimum thickness granolithic applied to cement and sand (1:3) backings to make up the full thickness specified.

Granolithic is to be composed of sound, hard, clean black trap chippings free from dust and graded 10 mm to 3 mm and selected clean granular sand or fine crushed black trap free of dust.

The aggregate to cement ratio is to be 3;1 of which the sand should not exceed 30% of the total aggregate. A satisfactory mix proportion, is generally of 1:1:2 cement, sand, aggregate but this must be ascertained by a trial mix and varied as required.

The paving is to be spread and compacted by hand-tamping or the use of vibrating compacting beams or metal rollers and hand floated after all surplus moisture has disappeared, each stage of the laying operation is to be properly carried out at the optimum degree of stiffness of the mix so that the aggregate remains correctly distributed throughout the pavings, etc., and so finished that the surface is true to level, dense, smooth and free of laintance and other defects and blemishes. The use of dry cement or sand to absorb surplus moisture will not be allowed.

Washed granolithic I to have all surplus cement brushed and washed off when the surface is sufficiently hard to resist the dislodgment of the aggregate.

Polished granolithic is to have all surplus cement brushed off when the surface is sufficiently hard to resist dislodgment of the aggregate. When the surface is hard enough it shall be wet ground using a machine until the aggregate is uniformly revealed and then well washed with clean water. Any small voids or holes left in the surface are to be filled with cement grout and rubbed down by hand. Mouldings, etc., not accessible to machines are to be hand rubbed and polished with carborundum. After an interval of 1 to 3 days the surface is to be finally machine ground using a fine adhesive.

S.27 Terrazzo paving and wall finishes

Terrazzo work shall be carried out by a specialist firm approved by the Architect in writing.

The provisions of “Granolithic pavings and wall Finishings” above generally apply except that the mix will be as follows.

The mix to be one part of the white or coloured cement to two parts of clean marble chippings washed and free from dust. The colour of the cement and chippings will be selected by the Architect and the chippings may vary in size from 3 mm to 16 mm and be graded in accordance with the Architects requirements. No work is to be commenced until sample areas of finished paving have been approved.

S.28 Division strips

To be set in position before paving is commenced and embedded straight and true.

S.29 Washed terrazzo wall finishings

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 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 finishings 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.

S.30 **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 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 finishings shall be masked and protected so as to prevent staining whilst a applying the tyrolean finish.

Tile, slab and Block Finishings

S.31 **Mortar for bedding and pointing**

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

S.32 **Preparation of surfaces**

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

S.33 Glazed ceramic wall tiles

Glazed ceramic wall tiles shall comply with B.S. 1281 and shall be of the sizes and colours described and have cushion edges.

The tiles shall be soaked in clean water for at least half an hour before fixing,s tacked on edge tightly together and end tiles turned glazed face 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 manufacturer’s recommendations, with straight joints 1.5mm wide pointed in white cement.

S.34 Cement interlocking tiles

Cement interlocking tiles shall be 20 mm thick of natural colour with bevelled top arrises on all sides and shall be bedded horizontally and vertically in hot bitumen when to roofs, or in cement mortar (1:4) coloured to match the tile when to floors. They shall comply with B.S. 1197.

All cement stains shall be carefully removed and sawdust shall not be used as protection until the joints are set.

S.35 Quarry tile paving

To be hard well burnt tiles to B.S.1286 of the sizes given herein and laid on prepared screeds. The tiles are to be soaked in clean water for at least six hours before use and bedded in cement and sand (1:4) approximately 3 mm thick with straight joints in each direction. Upon completion grout in coloured cement to match tiles and wash and clean down. Tiles are to be cut with an electric tile cutting saw.

S.36 Ceramic tile pavings and accessories

Ceramic tiles and accessories of the types described herein are to be fixed in an adhesive to comply with B.S. Code of Practice 202:1972 “Tile flooring and slab flooring”. Tiles are to be laid with close straight joints in each direction and upon completion grouted in matching coloured cement and washed and cleaned down. Tiles are to cut with an electric tile cutting saw.

S.37 Terrazzo tiles and granolithic tiles

Terrazzo or granolithic tiles shall be laid by a specialist approved by the Architect in writing, and shall be supplied from an approved source. The pre-cast terrazzo or granolithic 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 or granolithic finish not less than 12 mm thick consisting of coloured cement and marble or granite aggregate free from dust in the proportions of 1:2:5. 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 manufacture 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 or to falls as required. All cement stains shall be carefully removed. Sawdust shall not be used as a protection before joints are set.

S.38 Vinyl asbestos tiles

Vinyl asbestos tiles to K.S. 03-243 : 1980, 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 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 and

(b) 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.39 **Wood block flooring**

Wood block flooring shall be obtained from a supplier approved by the Architect 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 ceilings 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 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 or 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.

The adhesive used for the wood blocks is to be approved by the Architect before commencement of the work and in the case of the wood block flooring being laid on a surface bed the adhesive is to be of the waterproof variety.

Plain sheet finishings

S.40 Generally

Plywood, blockboard, chipboard, etc., and their fixing shall be as described in Carpentry and Joinery.

GLAZING

LIST OF CLAUSES

MATERIALS

WORKMANSHIP

GLAZING

MATERIALS

T.1 General

Glass used in glazing and for mirrors shall be best quality clear glass free from visibled defects so that to afford uninterrupted vision or reflection as appropriate and without obvious distortion.

T.2 Standards

Glass for glazing and mirrors shall be approved manufacture and is to comply with B.S. 952 in all respects free from flaws, bubbles, specks and other imperfections.

T.3 Clear sheet glass etc.

The clear sheet glass shall be ordinary glazing (OG) quality.

T.4 Plate Glass

Polished plate and Georgian wired polished plate glass to be selected glazing (SG) quality.

T.5 Obscured Glass

To be of type described and as approved Architect.

T.6 Solar Glass

Solar control glass is to be obtained from a manufacturer approved by the Architect. Details of the characteristic and properties of the glass are to be provided to the Architect before ordering.

Solar glass is to be of the spectrafloat type incorporating metallic irons in the glass with a bronze tinted colour. Unless otherwise specified thickness of glass is to be 6 mm.

T.7 Safety Glass

Where safety glass is required this shall be triplex.

T.8 Glazing Gaskets

Glazing to metal frames shall be secured with clip-in gaskets of butyl rubber. The gaskets shall be of size and section to suit the frame and glazing so as to provide a weather and air tight seal. The mechanical properties of the gasket shall be such as to resist the climatic conditions experienced in Kenya.

T.9 Washleather

Washleather shall be best quality chamois oil curved natural coloured. Where washleather is called for, an approved substitute may be employed.

T.10 Putty

a) The putty for glazing to wood sashes is to be linseed oil putty all as B.S. 644.

b) The putty for glazing to metal windows is to be gold size metal window putty specially designed for tropical use or patent mastic putty it approved by the Architect.

c) All putty shall be delivered or site in the original manufacturer's sealed cans or drums and used direct therefrom with the addition only of pure linseed oil necessary. No mineral or other oils may be in the putty except genuine linseed oil.

T.11 Mirrors

Mirrors shall be polished float glass silvering quality, protected at back with electro-copper backing coated with Shellac varnish and paint. The mirrors are to fixed with chromium plated done headed mirror screws with plastic or rubber distance pieces and washers unless otherwise stated and rates shall include for this.

Workmanship

T.12 General

Glazing of all types in all locations shall be carefully executed by artisans skilled in this type of work and in conformance with the recommendations of CP 152. Glazing shall be carefully fitted so that it is not subject to pressure and stresses imposed by being an overtight fit within framing.

T.13 Measurements

Each element (door, windows, etc) to receive glass shall be accurately measured to ensure a perfect fit subsequently.

T.14 Single Glazing

Single glazing shall be executed with glass of the various types described herein. Ordinary (non-safety) glass may be pre-cut or cut on site.

T.15 Wired Glass

Wired glass shall be cut so that the wires embedded are truly vertical and horizontal (i.e., at right angles to the cut
edges).

T.16 Safety Glass

Safety glass shall be factory cut before delivery to site. Site cutting will not be permitted.

T.17 Storage and Handling

Glass shall be delivered to site in stout containers and clearly marked. The containers shall incorporate sling attachment points for lifting pridles. Glass shall be stored under cover so that the panes are truly vertical.

T.18 **Protection**

After fixing, glass shall be bodily marked with paper or whitewash so that it is clearly visible. In positions where damage due to construction traffic or activity is likely to occur stout screens composed of hardboard or fibreboard on battens shall be arranged to protect the glass.

T.19 **Damage**

Should any glass delivered to site be found to be damaged it shall not be incorporate into the works without the express permission of the Architect. Should glazing installed be damaged for any reason it shall be removed and replaced free of charge to the satisfaction of the Architect. Should any adjacent works be damaged this shall equally be reinstated free of charge to the satisfaction of the Architect.

T.20 **Defective Work**

All glass shall be checked before installation to ensure that defective glass is not installed. Notwithstanding that, if in the opinion of the Architect any installed glazing is defective, it shall be removed and replaced free of charge to the satisfaction of the Architect.

T.21 **Glazing to Wood**

Glazing shall be secured to wood framing with hardwood beads. Edges shall be wrapped in washleather so that the washleather finishes just below the surface of the bead. No adhesives shall be used.

T.22 **Glazing to Metal**

Glazing shall be secured to metal framing with clip in butyl rubber gaskets.

T.23 Glass Thickness

Glass thickness shall conform to the recommendations of CP 152 and the manufacturer's recommendations for sizes of panes relative to the position in the building and the effects of wind pressure (both negative and positive).

T.24 Cleaning

All window glazed panels and mirrors shall be cleaned both inside and outside immediately prior to the hanging over of the building to the satisfaction of the Architect.

PAINTING AND DECORATING

LIST OF CLAUSE

MATERIALS

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 galvanised surfaces

U.37 Hardwood

U.38 Fibreboard

U.39 Plywood

U.40 Woodwork to be painted

U.41 Woodwork to receive clear finish

WORKMANSHIP

U.42 Standard of workmanship

U.43 Stirring of materials

U.44 Manufacturers instruction

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

U.53 Damage to adjoining surfaces

U.54 Cleanliness

U.55 Removal of ironmongery, etc

PAINTING EXISTING PAINTED SURFACES

U.56 General preparation

U.57 Preparation of metal surfaces

U.58 Preparation of metal surfaces

U.59 Preparation of wood surfaces

PAINTING AND DECORATING

MATERIALS

U.1 Colour range

Painting and decorative schemes shall be carried out in colours selcted 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 being 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 the site and rectification of any work executed with those materials, all at the Contractor's expense.

U.4 Delivery

All paints, varnishes, distempers and other surface coatings shall be delivered in sound, sealed containers, labelled clearly by the manufacturer, the label of the container stating:-

a) the type of product

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 printed label; typewritten labels will not be accepted.

The batch deliveries shall be dated and used strictly in order of delivery.

No paints, other than water based and bituminous paint, shall be delivered in containers exceeding 5 litres capacity.

U.5 Same makers materials used for coating

While materials for the work 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 undercoat).

U.6 Information and facilities to suppliers

The Contractor shall supply manufacturers with all relevant details of the materials required to comply with the description 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 be allowed to take samples of their products from the site if they so desire.

U.7 Storage

All materials shall be kept in a dry, clean store, protected from the element.

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 expense, to the satisfaction of the Architect.

U.9 **Knotting**

Stopping for:-

a) plasterwork, shall be a plaster based filler

b) cocnrete, 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 and cement.

d) Internal woodwork, hardboard and plywood, shall be putty complying with B.S. 544,

f) Clear finished woodwork, shall be 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. 259

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 manufactures instructions. Where described as applied externally, the paint shall incorporate an approved fungicide to prevent fungus growth.

U.16 **Black bituminous paint**

Black bituminous paint shall comply with B.S. 3416, Type 1 for general use, Type ii for drinking water tanks.

U.17 **Primer for alkaline surfaces**

Primer for alkaline surfaces shall be a special primer obtained from the manufacturer of the udnercoat 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, Type B.

b) Calcium plumbate priming paint complying with B.S. 3698, Type A.

U.21 **Primer for zinc or galvanised steel**

Primer for weatheredor new zinc and galvanised surfaces shall be calcium plumbate paint complying with B.S.3698, Type A.

U.22 **Creosote type preservative**

Creosote type preservative shall comply with B.S.144, or B.S. 3051.

U.23 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 of the undercoat and finishing coat.

U.25 **Primer for woodwork**

Primer for internal woodwork, other than the internal surfaces of external doors, windows and their frames and backs of frames and linings, etc. in contact with masonary, concrete or plaster, shall be leadless white or light grey priming paint not darker than 9-093 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 masonary, cocnrete or palster shall be lead based pink priming paint complying with B.S. 2521.

U.26 **Oil paints**

Hard gloss, semi-gloss matt and flat oil paints, and respective undercoats, shall be approved quality, as appropriate.

U.27 **Polyurethane lacquer**

Polyurethane lacquer shall be an approved single pack or two pack lacquer as described of interior or exterior quality, as appropriate.

U.28 **Decorative wood preservative**

Decorative wood preservative shall be “Pinotex”, “Timberguard” 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 herein before described.

U.31 **Plaster, rendering, cocnrete blockwork and brickwork**

All plaster or mortar spalcshes, etc shall be removed from plaster rendering, cocnrete, blockwork 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 cocnrete 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 deferred 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 material.

U.33 **Lead and copper**

Led and copper surfaces shall be washed with soap and water roughed with abrasive paper and washed with white spirit.

U.34 **Aluminium**

Aluminium surfaces shall be washed with white spirit and either carefully roughed with abrasive paper or treated with etching solution in accordance with the makers instructions.

U.35 **Iron and steel**

Before fixing, all rust and scale shall be removed from iron and steel surfaces by wire-brushing, scraping, hammering, flame cleaning etc.

U.36 **Zinc and galvanised surfaces**

Zinc and galvanised surfaces shall be washed with white spirit.

U.37 **Hardwood**

All dirt and grease shall be removed from hardwood surfaces. After priming, all nail holes and other imperfections shall be stopped.

U.38 **Fibreboard**

All dirt 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 filled as required with a plaster based filler for internal work, and a filler as described in “stopping” herebefore

for external work, and then rubbed down and all dust and loose materials 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 scroched back and coated with knotting.

After priming and fixing, all nail holes and other impefections 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 to a fine satin finish and all dust brushed off.

Workmanship

U.42 **Standard of workmanship**

Prior ro 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 be included in the Contract Sum. Such decorated surfaces shall be made good and touched up as necessary prior ro 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 the procedure approved by the Architect.

U.45 **Brush work**

Unless otherwise described, all coatings shall be applied by rush. 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 apllied while the timber is in any way damp. The stores and drying room shall be adequate size to allow for proper coating and storage of primed work. Primer 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 artcicles primed at works, the priming shall be touched up where required with a similar primer.

U.48 **Coating to be dry**

All coatings shall be allowed to be dry thoroughly before succeeding coats are applied.

U.49 **Rubbing down**

All undercoats for oil paints an 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 coatings 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 in storing materials, preparing surfaces or painting, etc., not to damage or stain other work. The Contractor shall remove 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.

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 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 refixed on completion.

Repainting existing painted surfaces

U.56 **General preparation**

The Contractor is to carefully examine all surfaces to be redecorated for signs of any defects in the underlying structure. Signs of any dampness, alkali action and loose or unsound plasterwork, loose putty, etc., are to be reported to the Architect before any further work on that area is put in hand.

U.57 **Preparation of plastered surfaces**

(a) <u>To be repainted with plastic emulsion or distemper</u>

After general examination of surfaces for defects as described above, the surfaces are to be washed and brushed down with a stiff fibre brush to remove dust or dirt preparatory to applying paint and all small cracks are to be made good with hard stopping.

(b) <u>To be repainted with oil paint</u>

After general examination of surfaces for defects as described above, the surfaces are to be washed and brushed down with a stiff fibre brush to remove dust or dirt preparatory to applying paint and all small cracks are to be made good with had stopping.

Rub down paint which, in the opinion of the Architect, is sound, firmly adhering and without sign of underlying defect, with waterproof glass paper as required to form a good key; rub down crazed, flaked, peeling, blistered, loose and rough local patches as required to produce a fair and

even surface throughout, remove areas of defective paint and wash down with clean water.

Bring forward local areas from which paint has been removed and other slight irregularities with alkali-resistant primer, filler and one undercoat,

PRELIMINARIES

ITEM	DESCRIPTION	AMOUNT
	BILL 1	
	PARTICULAR PRELIMINARIES	
A	**PARTIES**	
	(a) The " The Employer" is **Nanyuki Snowview Heights Ltd**	
	(b) The " The Architect" is **ATTICSPACE Arcitects Ltd** **P.O Box 6937-00100** **Nairobi**	
	(b) The " Quantity Surveyor" is **Amazon Consultants Ltd** **P.O. Box 1756- 00100** **Nairobi**	
B	**LOCATION OF SITE**	
	The site for the proposed works is in Nanyuki , Laikipia County	
	The Contractor shall be deemed to have visited the site and satisfied himself as to:-	
	a) The nature, position, topography and access of the site.	
	b) The amount of the rubbish or debris to be cleared away before commencement.	
	c) The nature, current usage, proximity and size of adjoining property and buildings.	
	d) The availability of land for the erection and positioning of all temporary structures, plant and materials necessary for the execution of the works.	
	The Contractor shall obtain approval from the relevant Local Authority in adherence to site access and erection of temporary structures and must ensure all matters relating to the requirements of these authorities.	
	No claim will be allowed for travelling or other expenses which may be incurred by the Contractor in visiting the site or preparing the tender for the works.	
	Carried to Collection	

A **EXISTING SITE CONDITIONS**

The Contractor is advised to take all measure to protect the existing site and its environs against pollution and distractions.

B **SCOPE OF CONTRACT AND DESCRIPTION OF THE WORKS**

The scope of work involves construction of a gate house, boundary wall & gates.

The works under this contract generally comprises of the following:-
a) Substructure works
b) Reinforced Concrete Superstructure works
c) Internal & External Finishes
d) Masonry Works
e) Boundary Wall
f) Gates

Carried to Collection

CONTRACT PARTICULARS

A FORM OF CONTRACT

The Form of Contract shall be the Agreement and Conditions of Contract for Small Construction Works, 2nd Edition 2022 (IQSK) herein referred to as the Agreement. Form of Bond and the Drawings may be viewed with arrangement of the Architect on any working day until the time appointed for the submission of tenders.

If the contractor considers that compliance with any of the conditions of contract of which headings are set out hereunder involves expense to him which is not included elsewhere in his prices, he shall set down opposite any such condition the value he attaches there to.

Clause

1 Agreement
2 Contract Documents
3 Language, Applicable Law And Currency
4 Project Consultants
5 Obligations of the Parties
6 Duties of the Project Consultants
7 Statutory Obligations and Compliance
8 Insurance
9 Temporary Works, Safety and Discoveries
10 Performance Security
11 Nominated Subcontractors and Suppliers
12 Works by Specialists Engaged Directly by Employer
13 Assignment and Subletting
14 Possession of Site and Commencement of Works
15 Programme of Works and Progress Reports
16 Electricity, Water and Other Services
17 Labour
18 Plant, Tools and Equipment
19 Setting Out
20 Tests and Samples
21 Site Instructions
22 Request For Information (RFI)
23 Site Meetings and inspectoins
24 Variations
25 Dayworks
26 Payments, Valuations and Certificates
27 Final Account

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28 Suspension of Works
29 Extension of Time
30 Claims for Loss and Expense
31 Termination
32 Termination Process
33 Force Majeure
34 Sectional Completion and Taking Over
35 Completion and Taking Over
36 Liquidated Damages
37 Warranties for Materials and Workmanship
38 Defects, Defects Liability Period and Latent Defects
39 Disputes Settlement
40 Appendix

A **EMPLOYER'S BOND**

The Employer shall not be required to provide a surety or bond.

B **CONTRACTOR'S BOND**

The Contractor shall find and submit on the Form of Tender the name of one Surety who shall be an established Bank or Insurance Company, who will be willing to be bound to the Employer in an amount equal to ten (10%) percent of the Contract amount specified herein for the due performance of the Contract up to the date of practical completion as certified by the Architect and who will, when and if called upon, sign a bond to that effect on the Contract Agreement (without the addition of any limitations) on the same day as the Contract Agreement is signed.

No additional costs shall be entertained for a performance bond that deviates from the FORM OF PERFORMANCE BOND BY THE CONTRACTOR as spelt out in the Agreement and Conditions of Contract for Small Construction Works, .

In the event of the Surety named in the Form of Tender not being approved by the Employer, the Contractor shall furnish within seven days another Surety to the approval of the Employer.

C **INSURANCE AGAINST INJURY TO PERSONS AND PROPERTY**

The Contractor shall take out insurance in accordance with Condition 8 of the Agreement and to the Employer's approval and shall provide the Employer with a copy of such insurances for their approval and record.

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A	**INSURANCE OF THE WORKS** The Contractor shall insure the works in accordance with Condition 8 of the Agreement. No payment on account of the work executed will be made to the contractor until he has satisfied the Architect and Employer either by production of an Insurance Policy or an Insurance Certificate that the provisions of the foregoing Insurance Clauses have been complied with in all respects and to their satisfaction. Thereafter the Architect shall from time to time ascertain that premiums are duly paid up by the Contractor who shall, if called upon to do so produce receipted premium renewals for the Architect's inspections.	
B	**FIXED PRICE CONTRACT** This is a fixed price contract. The contract price shall be deemed to have been calculated to include all duties on materials and goods to be incorporated into the finished Works unless otherwise stated in the contract. If at any time during the period of the contract the duties shall be varied and this shall affect the cost to the Contractor of such materials, then the Quantity Surveyor shall assess the net difference in cost of such materials. Any amount from time to time so assessed shall be added to or deducted from the contract price, as the case may be. For purposes of this clause, „duties" shall include all customs and excise charges, tariffs, V.A.T. and other taxes and duties imposed by statutory or other authority in the country where the Works are being carried out.	
C	**POSSESSION AND COMMENCEMENT** The Contractor shall take possession of the site on the date indicated in the acceptance letter. The date of commencement of the works shall also be communicated to the Contractor and the contract period shall run from the commencement date. The Contractor is expected to utilise the period between possession and commencement to mobilise his resources to ensure smooth running of the works from the commencement date.	
D	**DAYWORKS** Any dayworks ordered under Clause 25 shall be executed at the following rates:- LABOUR: The prime cost to which _____ per centum shall be added	
	Carried to Collection	

MATERIALS:The prime cost (delivered to site) to which _____ per centum shall be added

PLANT: The net hire charge to which _____ per centum shall be added.

PARTICULAR PRELIMINARIES

COLLECTION

Carried from page 1/1

Carried from page 1/2

Carried from page 1/3

Carried from page 1/4

Carried from page 1/5

Particular Preliminary Carried to Main Summary

ITEM	DESCRIPTION	AMOUNT
	GENERAL PRELIMINARIES	
A	PRICING OF ITEMS OF PRELIMINARIES AND PREAMBLES Whenever in the Contractor's priced Bills of Quantities no price appears against an item of Preliminaries or Preambles, the value of such item shall be deemed to be included in his prices for other items in the Bills of Quantities.	
B	ABBREVIATIONS Throughout these Bills, units of measurements and terms are abbreviated and shall be interpreted as follows: mm shall mean millimeter lm shall mean linear meter sm shall mean square meter m^2 shall mean square meter cm shall mean cubic meter kg shall mean kilogramme N shall mean Newton KN shall mean KiloNewton in/" shall mean inches L f shall mean linear foot s f shall mean square foot c f shall mean cubic foot L b shall mean pound avoirdupois No. shall mean number B.S. shall mean the current British Standard Specification published by the British Standard Institution, 2 Park Street, LONDON W.I, England.	
	Carried to collection	

B.S.M shall mean both sides measured

K.S. shall mean current Kenya Standard specification published by the Kenya Bureau of Standard, P.O. Box 54974. NAIROBI, Kenya.

As described' shall mean as described in these Bills of Quantities.

As before described' shall mean the whole of the previous description except as qualified in the current one.

A VISIT SITE AND EXAMINE DRAWINGS

The Contractor is recommended to examine the drawings and visit the site, the location of which is herein described. He shall be deemed to have acquainted himself therewith as to its nature, position, means of access or any other matter which may affect his tender. No claim arising from his failure to comply with this recommendation will be considered.

B METHOD OF MEASUREMENT

The works are measured in accordance with the Standard Method of Measurement of Building Works 2008 Edition, published by the Architectural Association of Kenya.

C PRICING RATES

The tenderer shall include for all costs in executing the whole of the works, including transport, replacing damaged items, fixing, all to comply with the said Conditions of Contract.

D TRADE PREAMBLES

For the full description of material and workmanship method of execution of the work and notes for pricing the Contractor is referred to the specification and preambles which follow in this document, and which shall be followed in all respects unless they conflict with the Preliminaries, or other items in these Bills of Quantities shall apply.

Carried to collection

A	**PROGRESS CHART** The Contractor shall allow for providing, within two weeks of the date for possession of the site, and in agreement with the Architect and Employer, a Progress Chart for the whole of the Woks including the Works of Nominated Sub-Contractors. One copy shall be forwarded to the Architect and another to the Employer and a further copy shall be retained on the site on which the progress shall be recorded by the Contractor. Should any circumstances arise affecting the programme or progress, the chart shall be modified as necessary within 2 weeks and the Architect and Employer informed.	
B	**PLANT, TOOLS AND VEHICLES** Allow for providing all scaffolding, plant, tools and vehicles required for the works unless stated otherwise herein and except for such items specifically and only required for the use of the nominated Sub-Contractor as described herein. No timber used for scaffolding, formwork or temporary works of any kind shall be used afterwards in the permanent work. All such plant, tools and scaffolding shall comply with all regulations whether general or local in force throughout the period of the contract and shall be required as may be necessary to comply with any amendments in or additions to such regulations.	
C	**MATERIALS AND WORKMANSHIP** All work is to be carried out in accordance with the Ministry of Works General Specifications for Building Works, 1976 Edition together with any amendments thereto. All materials and workmanship used in the execution of the works shall be of the best quality and description unless otherwise described. The Contractor shall order all materials to be obtained from overseas immediately after the Contract is signed and shall also order materials to be obtained from local sources as early as necessary to ensure that they are on site when required for use in the works. The Bills of Quantities shall not be used for the purposes of ordering materials.	
	Carried to collection	

A	**SIGN FOR MATERIALS SUPPLIED** In case of supply of any materials by the Client, the Contractor will be required to sign a receipt for all articles and materials supplied by the Employer at the time of taking delivery thereof, as having received them in good order and condition, and will thereafter be responsible for any loss or damage and for replacement of any such loss or damage with articles and/ or materials which will be supplied by the Employer at current market prices including all duties and taxes, all the Contractor's own cost and expense, to the satisfaction of the Employer.	
B	**STORAGE OF MATERIALS** The Contractor shall provide at his own risk and cost where directed on the site, weatherproof lockup sheds for the safe storage and custody of materials for the works and for the use of workmen engaged thereon and shall remove such sheds and make good damaged or disturbed surfaces upon completion to the satisfaction of the Architect. Nominated Sub-Contractors are to be liable for the cost of any storage accommodation provided especially for their use.	
C	**SAMPLES AND TESTING** The Contractor shall furnish at his own cost any samples of materials or workmanship including concrete test cubes required for the works that may be called for by the Architect for his approval or rejection until such samples are approved by the Architect and the Architect may reject any materials or workmanship notin his opinion up to the approved samples. The Contractor shall arrange for the testing of such materials as directed by the Architect. The Contractor shall pay all charges in connection with the test and such costs are deemed to be included in his tender. Notwithstanding the result of the tests, the Architect may reject any materials that in his opinion are not in accordance with the specification. The procedure for submitting samples of materials for testing and the method of marking for identification shall be as laid down by the Architect. The Contractor shall allow in his tender for making and delivering samples for testing and paying all charges of the approved testing laboratory.	
	Carried to collection	

A	**GOVERNMENT ACTS REGARDING WORK PEOPLE, ETC**	
	Allow for complying with all Government Acts, Orders and Regulations in connection with the employment of labour and other matters related to the execution of the works. In particular the Contractor's attention is drawn to the provisions of the Factory Act of 1950, and his tender must include for all costs arising or resulting from compliance with any Act, Order or Regulations relating to Insurance, Pensions and Holidays for workpeople or the safety, health or welfare of workpeople.	
	The Contractor must make himself fully acquinted with current Acts and Regulations, including Police Regulations regarding the movement, housing, security and control of labour, labour camps, passes for transport, etc. It is important that the Contractor before tendering, shall obtain from the relevant Authority the fullest information regarding all such regulations and/ or restrictions which may affect the organisation of the works, supply and control of labour etc., and allow accordingly in his tender. No claim in respect of want of knowledge in this connection will be entertained.	
B	**LABOUR CAMPS**	
	The contractor will not be allowed to erect labour camps on site and shall take full responsibility for transporting labour daily to and from the site as required, and the cost of this shall be deemed to be included in his tender.	
C	**SIGN BOARD**	
	The Contractor shall provide and erect where directed; and maintain during the whole period of the building operation and remove at completion, one approved temporary sign board to the Architect's standard design giving a brief description of the works, an illustration of the design and showing the names of the employer and the consultants, with sufficient space to append the names of the Sub-Contractors and suppliers when known. The lettering concerning the consultants is not to be more than 50mm high.	
	Carried to collection	

A	**OFFICE FOR THE CONSULTANTS** The contractor shall , if so instructed, supply, maintain, service, clean and light a fully furnished, suitable office, having an approximate floor area of not less than 100 sqm for exclusive use of the project. The office shall have a sample room, a toilet and bathroom, kitchen of suitable dimensions with clean running water and electricity connected to the approval of the Project Manager. On completion of the contract the contents of the office specified above shall revert to the Client. The contractor shall be responsible throughout the contract period for provision of insurance cover, maintenance of the office equipment and furniture, providing all necesary staff and providing security and garbage disposal facilities.	
B	**POSSESSION AND COMMENCEMENT** The Contractor shall take possession of the site on the date indicated in the acceptance letter. The date of commencement of the works shall also be communicated to the Contractor and the contract period shall run from the commencement date. The Contractor is expected to utilize the period between possession and commencement to mobilize his resources to ensure smooth running of the works from the commencement date.	
C	**TELEPHONE** The Contractor shall provide telephone facilities during the contract period and pay all charges.	
D	**DOMESTIC SUB-CONTRACTORS** Any domestic Sub-Contractor shall be approved by the Architect in writing before the Contractor sublets any portion of the works. The Contractor should especially note this for Civil Works and Services.	
E	**RECORDS** The Contractor shall ensure proper records are kept and maintained for: Daily Reports on Personnel and Machinery; tracked programme; site photographs in digital camera; weather charts/reports; site instruction book and query book. A digital camera shall be provided for taking good quality progress photos and videos and sharing with the project team bi-weekly.	
	Carried to collection	

A	**SECURITY OF WORKS AND FENCING**	
	The Contractor shall be entirely resposible for the security of the works and shall provide all necessary watching, lighting, cctv and other precautions necessary to ensure security against theft, loss or damage; and the safety and protection of the public.	
	The Contractor shall also be entirely responsible for the security of the stores, materials, plant, personnel, etc., both his own and the Sub-Contractors' and shall take all measures and precautions as necessary.	
	The Contractor shall leave works secure at completion with all accesses locked, account for all keys and hand over to the Architect with an itemised schedule, retaining a duplicate schedule signed by the Architect as receipt.	
B	**PUBLIC AND PRIVATE ROADS**	
	The Contractor shall maintain as required throughout the execution of the works and make good any damage to public or private roads arising from or consequent upon the execution of the works to the approval of the local or other competent authority and the Architect.	
C	**EXISTING PROPERTY**	
	The Contractor shall take every precaution to avoid damage to all existing property including roads, cables, drains and other services, and he will he held responsible for and shall make good all such damage arising from the execution of this Contract at his own expense to the satisfaction of the Architect.	
D	**ACCESS TO SITE AND TEMPORARY ROADS**	
	Means of access to the site shall be agreed with the Employer prior to commencement of the work and the Contractor must allow for building any necessary temporary access roads for the transport of the materials, plant and workmen as may be required for the complete execution of the works including the provision of temporary culverts, crossing, bridges, or any other means of gaining access to the site.	
	Upon completion of the works, the Contractor shall remove such temporary access roads, temporary culverts, bridges, etc., and make good reinstate all works and surfaces disturbed to the satisfaction of the Architect.	
	Carried to collection	

A	**AREA TO BE OCCUPIED BY THE CONTRACTOR** The area of the site which may be occupied by the Contractor for use of storage and for the purpose of erecting workshops, etc., shall be defined on the site by the Architect or client.	
B	**WATER FOR THE WORKS** The Contractor shall provide at his own risk and cost all necessary water required for use in all the works, including Sub-Contract works. No guarantee is given or implied that sufficient water will be available from the mains and the Contractor must make his own arrangements for augmenting this supply at his own cost if necessary. He must also provide temporary storage tanks and meters as required at his own cost and clear when no longer required and make good on completion to the entire satisfaction of the Architect. The Contractor shall pay all charges in connection therewith.	
C	**ELECTRICITY FOR THE WORKS** The Contractor shall provide at his own risk and cost all necessary electricity light and power required for use in all the works, including Sub-Contract works. No guarantee is given or implied that sufficient electricity supply will be available from the mains and the Contractor must make his own arrangements for augmenting this supply at his own cost if necessary. He must also provide temporary meters as required at his own cost and clear when no longer required and make good on completion to the entire satisfaction of the Architect. The Contractor shall pay all charges in connection therewith.	
D	**SANITATION OF THE WORKS** The sanitation of the works shall be arranged and maintained by the Contractor to the satisfaction of the Government and/ Local Authorities, Labour Department, and the Architect.	
	Carried to collection	

A	**SUPERVISION AND WORKING HOURS**	
	The works shall be executed under the direction and to the entire satisfaction in all respects of the Architect who shall at all times during normal working hours have access to the works and to the yards and workshops of the Contractor and Sub-Contractor or other places where work is being prepared for the Contract.	
	The working hours shall be those generally worked by good employers in the Building and Civil Engineering Trades in Kenya. No work shall be carried out at night or on gazetted holidays unless the Architect shall so direct. No work shall be covered up nor shall any concreting be carried out in the absence of the Clerk of Works without the prior approval of the Architect in writing.	
	The Contractor may be required to execute some of the work outside the normal working hours with prior arrangements. These will be communicated to the architect for planning and approval purposes. No extensions to the approved hours will be allowed without notification in advance.	
B	**PROVISIONAL SUMS**	
	The term "Provisional Sum" wherever used in these Bills of Quantities shall have the meaning stated in Section A, Item A6 (I) of the Standard Method of Measurement. Such sums are net and no addition shall be made to them for profit.	
C	**PRIME COST (OR P.C.) SUMS**	
	The term "Prime Cost Sum" or "P.C. Sum" wherever used in these Bills of Quantities shall have the meaning stated in Section A Item A6 (II) of the Standard Method of Measurement.	
	Persons or firms nominated by the Architect to execute work or to provide and fix materials or goods as stated in condition No. 19 of the conditions of contract are described herein as Nominated Sub-Contractors. Persons or firms so nominated to supply goods or materials are described herein as Nominated Suppliers.	
	Carried to collection	

A	**ADJUSTMENT OF P.C. SUMS** In the final account all P.C. Sums shall be deducted and the amount properly expended upon the Architect's order in respect of each of them added to the Contract Sum. The Contractor shall produce to the Architect such quotations, invoices or bills properly receipted as may be necessary to show the actual details of the sums paid by the Contractor. Items of profit upon P.C. Sums shall be adjusted in the final account pro-rata to the amount paid. Items of "attendance" and "special attendance" following P.C. Sums shall be adjusted pro-rata to the Physical extent of the work executed (not pro-rata to the amount paid) and this shall apply even though the Contractor's priced Bill shows a percentage in the rate column in respect of them. Should the Contractor be permitted to tender and his tender be accepted for any work for which a P.C. Sum is included in these Bills of Quantities profit an attendance will be allowed at the same rate as it would be if the work were executed by a nominated Sub-Contractor.	
B	**ADJUSTMENT OF PROVISIONAL SUMS** In the final account all Provisional Sums shall be deducted and value of the work properly executed in respect of them upon the Architect's order added to the Contract Sum. Such work shall be valued as described for variations in Condition No. 24 of the Conditions of Contract, but should any part of the work be executed by a Nominated Sub-Contractor or any articles for the work to be supplied by a Nominated Supplier, the value of such work or articles shall be treated as a P.C. Sum and profit and attendance comparable to that contained in the priced Bills of Quantities for similar items added.	
C	**NOMINATED SUB-CONTRACTORS** When any work is ordered by the Architect to be executed by nominated sub-contractors, the contractor shall enter into sub-contracts as described in Condition No. 19 of the conditions and shall thereafter be responsible for such sub-contractors in every respect. Unless otherwise described the Contractor is to provide for such sub-contractors any or all of the facilities described in these Preliminaries.	
	Carried to collection	

	The Contractor should price for these with the nominated sub-contractor's work concerned in the P.C. Sums under the description "Add for Attendance".	
A	ATTENDANCE UPON NOMINATED SUB-CONTRACTORS The term "attendance" following P.C. Sums for Nominated Sub-Contractors' work in these Bills of Quantities shall be deemed to include both attendance and items of special attendance.	
B	DIRECT CONTRACTS Notwithstanding the foregoing conditions, the Employere reserves the right to place a "Direct Contract" for any goods or services required in the works which are measured or covered by a P.C. or Provisional Sum in the Bills of Quantities and to pay for the same direct. In any such instance, profit relative to the P.C. Sums in the priced Bills of Quantities will be adjusted as described for P.C. Sums.	
C	ATTENDANCE UPON OTHER TRADESMEN, etc. The Contractor shall allow for the attendance of trade upon trade and shall afford any tradesmen or other person employed for the execution of any work not included inthis contract every facility for carrying out their work and also for the use of his ordinary scaffolding. The contractor, howevr, shall not be required to erect any special scaffolding for them. The Contractor shall perform such cutting away for and making good after the work of such tradesmen or persons as may be ordered by the Architect and the work will be measured and paid for the extent executed at rates provided in these Bills.	
D	PROVISIONAL WORK All work described as " Provisional" in these Bills of Quantities is subject to re-measurement in order to ascertain the actual Quantity executed for which payment will be made.	
	Carried to collection	

All "Provisional" and other work liable to adjustment under this contract shall be left uncovered for a reasonable time to allow all measurements needed for such adjustment to be taken by the Quantity Surveyor. Immediately the work is ready for measuring, the Contractor shall give notice to the Quantity Surveyor.

If the Contractor makes default in these respects he shall if the Architect so directs uncover at his expense the work to enable all measurements to be taken and afterwards reinstate at his own expense.

B **MATERIALS ARISING FROM EXCAVATIONS**

Materials of any kind obtained from the excavations shall be property of the Employer. Unless the Architect directs otherwise, such materials shall be dealt with as provided in the contract. Such materials shall only be used in the works, in substitution of materials which the Contractor would otherwise have had to supply with the written permission of the Architect. Should such permission be given the Contractor shall make due allowance for the Value of the materials so used at a price to be agreed.

C **SAFETY MEASURES**

The contractor is to adhere to strict safety measures. In this regard the contractor should ensure that all his workers, the consultants and his sub-contractors workmen are wearing Personal Protective Equipment (PPE) before commencement of any work where applicable including overalls with the company name clearly printed on the back each with clearly marked Identification Numbers stitched or imprinted on. The Contractor shall allow for providing all watching, lighting, barriers,signs, covering open trenches and protection of the works, including Sub-Contract works, as may be necessary for the safety of the works and for the protection of the public and his own and Sub-Contractors' employees. The Contractor is to allow for all temporary protection required during the works including ordinary and special dust screens, hoardings, barriers, warning signs etc. as directed by the Architect and as necessary for the adequate protection of adjacent property and finishes, workmen employed upon the site and the public. Any damage or loss incurred due to the insufficiency of such protection must be made good by the Contractor. All protective devices are to be removed on completion of the work and any necessary making good consequent upon this is to be executed to the satisfaction of the Architect The Architect expects full compliance to this regulation and no excuses will be entertained for non-compliance.

Carried to collection

	The Contractor shall allow for providing sanitizers and the contractor shall observe all the guidelines provided by the MOH and NCA on complying with revised Health Act due to COVID-19. These include but are not limited to providing sanitizers, hand washing points, thermo guns and exercising social distancing.	
A	**HOARDING**	
	The contractor, if so instructed, should erect hoarding comprising timber framework and 30 gauge GCI sheets to Architect's approval .The Contractor is to obtain any necessary permits, maintain in position, pay all necessary fees and finally clear away all hoarding on completion.	
B	**REMOVAL OF RUBBISH, etc.**	
	Remove all rubbish and debris from the buildings and site as it accumulates and at completion of the works and remove all plant, scaffolding and unused materials at completion.	
C	**WORKS TO BE DELIVERED UP CLEAN**	
	Clean and flush all gutters, rainwater and waste pipes manhole and drains, wash (except where such treatment might cause damage) and clean all floors, sanitary fittings, glass inside and outside and any other parts of the works which may require it; remove all marks, blemishes, stains and defects from joinery fittings and decorated surfaces generally, polish door furniture and bright parts of metalwork and leave the whole of the buildings watertight, clean, perfect and fit for occupation to the approval of the Architect.	
D	**ALTERATIONS TO BILLS, PRICING, etc.**	
	Any unauthorised alteration or qualification made to the text of the Bills of Quantities may cause the Tender to be disqualified and will in any case be ignored. The Contractor shall be deemed to have made allowance in his prices generally to cover any items against which no price has been inserted in the priced Bills of Quantities.	
	All items of measured work shall be priced in detail and Tenders containing Lump sums to cover trades or groups of work must be broken down to show the price of each item before they will be accepted. Lump sums to cover items of Preliminaries shall be likewise broken down if so required.	
	Carried to collection	

E	**TRAINING LEVY** The Contractor's attention is drawn to the current Legal Notice of 2007 (and subsequent amendments) which requires payment of Training Levy on all contracts of more than Kenya Shillings Fifty Thousand (KShs.50,000/=) in value and his tender must include for all costs arising or resulting therefrom.	
A	**VALUE ADDED TAX** The Contractor's attention is drawn to V.A.T PUBLIC NOTICE NO. 6 of 5th August, 1993 regarding the Finance Bill 1993 which expanded the V.A.T base to cover construction services amongst other items and sum. The Contractor shall familiarize himself with the said notice and allow in all his Bills of Quantities rates (Excluding P.C and Provisional Sums) for the net tax. (i.e. less input tax where applicable) as required by law. Please note that allowing a lump sum tax either in preliminaries or in summary page shall not be acceptable. Any additional information and assistance concerning the application of the said notice should be directed to the office of the Commissioner of Value Added Tax. The Contractor is required to note that all Prime Cost and Provisional Sum given in the Bills of Quantities are inclusive of VAT.	
	Carried to collection	

	GENERAL PRELIMINARIES	
	COLLECTION	
	Carried from page 1/8	
	Carried from page 1/9	
	Carried from page 1/10	
	Carried from page 1/11	
	Carried from page 1/12	
	Carried from page 1/13	
	Carried from page 1/14	
	Carried from page 1/15	
	Carried from page 1/16	
	Carried from page 1/17	
	Carried from page 1/18	
	Carried from page 1/19	
	Carried from page 1/20	
	Carried from page 1/21	
	General Preliminaries Carried to Main Summary	

BILLS OF QUANTITIES

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	BILL NO. 2				
	GATE HOUSE				
	GROUND FLOOR				
	ELEMENT NO. 1				
	SUBSTRUCTURES (ALL PROVISIONAL)				
	Note the following:				
	i.) Excavation measured net: no working space allowed: tenderer shall allow for all working space within the rates.				
	ii.) Rock levels and types shall be agreed with consultants prior to commencement of respective excavations				
	Excavations and Earthworks				
A	Mass excavate to remove black cotton soil commencing from stripped level depth n.e 1.5m.	CM	19		
B	Excavate for trenches commencing from reduced level depth n.e 1.5m.	CM	3		
C	Ditto for column bases depth n.e 1.5m deep.	CM	1		
D	Extra over excavation for excavating in all types of rock and cart away.	CM	2		
	Carried to collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	Disposal				
A	Remove surplus excavated material in soil heaps and cart away from site to the designated and approved dumping site	CM	22		
	Planking and Strutting				
B	Planking and strutting to all sides of excavations: keep excavations free from all fallen materials	Item	1		
	Disposal of Water				
C	Keep all excavations free from all water, including spring or running water, by pumping or bailing or any other means as approved by the Engineer	Item	1		
	Filling				
D	Approved imported soil filling rolled and compacted in layers not exceeding 150mm thick to Engineer's satisfaction.	CM	9		
E	300mm thick approved hand packed hardcore filling, rolled and compacted in layers not exceeding 150mm thick.	CM	5		
F	50mm thick well watered fine murram on compacted surface of existing hardcore to receive damp proof membrane	SM	16		
	Surface Treatment				
G	Anti-termite insecticide treatment as "termidor 96 SC" or equal and approved applied to foundations and blinded hardcore surfaces in accordance to the manufacturer's printed instructions. Allow for providing a written guarantee of Ten (10) years to the Employer (effective from date of application) from an approved firm (state name of the firm .....)	SM	16		
	Damp-proofing				
H	One layer 1000 gauge clear(colourless) polythene sheet damp proof membrane: under floor bed: area measured net with no allowance for laps	SM	16		
	Carried to collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	50mm thick Plain Concrete Blinding (Class 15) to:				
A	Strip foundations	SM	11		
B	Column Bases	SM	2		
	Vibrated Reinforced Concrete (Class 25/20) to:				
C	Strip foundation	CM	2		
D	Column bases	CM	1		
E	Foundation Columns	CM	1		
F	150mm thick bed	SM	16		
	Reinforcement *Deformed high yield steel ribbed bars reinforcement to KS 573:2014 for cutting, bending, hoisting and fixing including all necessary tying wires, distance blocks, spacers, templates and stools*				
G	D8	Kg.	128		
H	D10	Kg.	192		
	Fabric Mesh				
J	Steel wire fabric mesh reinforcement to B.S. 4483 Ref: A142 in one layer in concrete bed (measured net, no allowance made for minimum 225mm laps) including tying and supporting as required	SM	16		
	Sawn formwork to:-				
K	Sides of strip foundation	SM	7		
L	Sides of column bases	SM	3		
M	Sides of columns	SM	2		
N	Edges of floor bed 75-150 mm high	LM	16		
	Carried to collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	Foundation Walling				
	Quarry natural stone walling, average 7.0N/mm2, bedded, jointed and pointed in cement and sand mortar (1:3) and reinforced every alternate course with 20 gauge hoop iron				
A	200mm thick walling	SM	21		
	Plinths				
B	Minimum 15mm thick two coat external render, finished with wood float to receive finishes(m/s)	SM	6		
C	Prepare surfaces and apply one undercoat and two finishing coats of black bituminous paint on rendered surface	SM	6		
	Carried to Collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	BILL NO.2				
	GATE HOUSE				
	GROUND FLOOR				
	ELEMENT NO.1				
	SUBSTRUCTURES				
	COLLECTION				
		Page No			
	Total Brought forward from Page No.	1			
		2			
		3			
		4			
	Carried Forward to Summary of Bill No. 2				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	GROUND FLOOR				
	ELEMENT NO. 2				
	REINFORCED SUPERSTRUCTURE				
	Vibrated Reinforced Concrete (Class 25/20) to:				
A	Beams	CM	1		
B	Columns	CM	1		
C	150mm thick suspended slab	SM	16		
	Reinforcement				
	Deformed high yield steel ribbed bars reinforcement to KS 573:2014 for cutting, bending, hoisting and fixing including all necessary tying wires, distance blocks, spacers, templates and stools				
D	D8	Kg.	141		
E	D16	Kg.	211		
	Fairfaced monolithic formwork to:-				
F	Sides and soffits of beam	SM	9		
G	Sides of columns	SM	14		
H	Soffits of suspended slab	SM	16		
J	Edges of suspended slab 75-150mm high	LM	16		
	Carried Forward to Summary of Bill No. 2				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	ELEMENT NO. 3				
	WALLING				
	External Walling				
	Machine cut local Block stone walling, average 7.0N/mm2, bedded, jointed and pointed in cement and sand mortar (1:3) and reinforced every alternate course with 20 gauge hoop iron				
A	200mm thick walling	SM	42		
	Internal Walling				
	Machine cut local Block stone walling, average 7.0N/mm2, bedded, jointed and pointed in cement and sand mortar (1:3) and reinforced every alternate course with 20 gauge hoop iron				
B	200mm thick walling	SM	7		
	Damp Proof Course				
	3 ply bituminous damp proof course (measured net - no allowance made for laps)				
C	200mm wide	LM	18		
	Carried Forward to Summary of Bill No. 2				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	ELEMENT NO. 4				
	DOORS				
	Mild Steel Door				
	Standard steel casement door overall size comprising 40 x 25 x 3 mm stiles, bottom & top rail, & 4No intermediate rails; all primed with red oxide; complete with hinges, stays, fasteners assembled and fixed to opening including cutting and pinning lugs to concrete or blockwork surround and bedding frame in cement and sand mortar (1:4)				
A	Size 1200 x 2400mm high door	No.	1		
	Timber doors				
	50mm thick solid flush doors to BS 459 faced with 6mm thick interior plywood veneered for polishings and lipped on all edges in hardwood including all planted mouldings				
B	Door overall size 900 x 2400mm high	No.	1		
	Wrot cypress or other equal and approved softwood frames and finishings				
C	100 x 50mm moulded door frame with labours	LM	6		
D	50 x 25mm architrave with labours	LM	6		
E	25 x 25mm Quadrant beading.	LM	2		
	Glazing				
	4mm thick clear sheet glass:-				
F	Panes 0.5 to 1.0 square metres	SM	1		
	Carried to collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	Iron Mongery				
	Supply and fix the following UNION or other equal and approved ironmongery complete with all matching screws, keys and all necessary hardware to timber.				
A	100mm steel pressed hinges	PRS	2		
B	2 Lever mortice lock	No.	1		
C	38mm Rubber Door Stop.	No.	2		
	Painting				
	Wrot mahogany or other equal and approved hardwood frames and finishings				
D	100 x 50mm moulded door frame with labours	LM	6		
E	50 x 25mm architrave with labours	LM	6		
F	25 x 25mm Quadrant beading.	LM	2		
	Prepare surfaces and apply approved stain, sanding sealer and one undercoat and two finishing coats of 1st quality clear polyurethane varnish to:-				
G	General timber surfaces (both sides measured)	SM	4		
H	Surfaces between 100mm and 200mm girth	LM	6		
J	Ditto not exceeding 100mm girth	LM	8		
	Carried to collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	BILL NO.2				
	GROUND FLOOR				
	ELEMENT NO.4				
	DOORS				
	COLLECTION				
	Total Brought forward from Page No.				
	Carried Forward to Summary of Bill No. 2				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	ELEMENT 5				
	WINDOWS				
	Window Cill				
A	250 x 75mm Precast concrete (class 20) sunk, weathered and throated cill cast in convenient lengths, reinforced as necessary for handling, bedded, jointed and pointed in gauged mortar and finished fair on all exposed faces.	LM	4		
	Aluminium Windows				
	Supply and fix purpose made powder coated aluminium windows in 1.6mm thick black anodised aluminium profiles infilled with 8.38mm clear laminated glass				
B	Window size 1500 x 1500mm high;	No.	2		
	Carried to Collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	BILL NO.2				
	GROUND FLOOR				
	ELEMENT NO.5				
	WINDOWS				
	COLLECTION				
		Page No			
	Total Brought forward from Page No.	11			
	Carried Forward to Summary of Bill No. 2				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	ELEMENT 6				
	EXTERNAL FINISHES				
	Wall Finishes				
	15mm (minimum) Two coat external render on concrete and masonry surfaces finished with a wood float to receive finishes (m/s).				
A	Concrete surfaces to receive painting	SM	7		
B	Masonry surfaces to painting	SM	42		
	Prepare and apply one coat Alkali Resistant Primer and one coat of silicone Exterior Emulsion paint in accordance with the manufacturers written instructions and to the satisfaction of the architect				
C	Rendered walls and concrete surfaces externally	SM	49		
	Carried Forward to Summary of Bill No. 2				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	ELEMENT NO. 7				
	INTERNAL FINISHES				
	Floor Finishes				
	Cement and sand screed laid to falls (1:4) to:-				
A	30mm thick bed on concrete to receive tiles.	SM	12		
	Supply and Fix ceramic tiles : (Allow the Prime Cost rate of Kshs.1100/m² for purchasing of tiles to be selected by the Architect); fixed with approved quality adhesive in accordance with manufacturers instructions :bedded on screeds (measured separately) : jointed, pointed and grouted in matching colour cement mortar including all spacers , expansion joints and aluminium edge/corner strips : all in accordance with Architect's detail drawings and approval				
B	Floor tiles	SM	12		
C	Ditto but 100mm high skirting	LM	17		
	Carried to collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	Wall Finishes *Minimum 15mm thick two coat internal lime plaster, finished smooth,straight and plumb with steel trowelled finish, as described to:-*				
A	Finished smooth with a steel trowel to receive paint (m/s)	SM	38		
B	Finished with a wood float to receive ceramic tiles (m/s)	SM	24		
	Prepare and apply Emulsion or Universal Undercoat followed by 3 coats of Soft Satin Emulsion paint on and including water resistant skim coat both in accordance with the manufacturers written instructions and to the satisfaction of the architect to:				
C	Plastered masonry and concrete surfaces	SM	38		
	Supply and Fix ceramic tiles : (Allow the Prime Cost rate of Kshs.1500/m² for purchasing of tiles to be selected by the Architect); fixed with approved quality adhesive in accordance with manufacturers instructions :bedded on screeds (measured separately) : jointed, pointed and grouted in matching colour cement mortar including all spacers , expansion joints and aluminium edge/corner strips : all in accordance with Architect's detail drawings and approval				
D	Ceramic wall tiles	SM	24		
	Ceiling Finishes *Minimum 15mm thick two coat internal lime plaster, finished smooth,straight and level with steel trowelled finish, as described to:-*				
E	Soffits of suspended slab	SM	13		
	Prepare and apply Emulsion or Universal Undercoat followed by 3 coats of Soft Satin Emulsion paint on and including water resistant skim coat both in accordance with the manufacturers written instructions and to the satisfaction of the architect to:				
F	Plastered soffits of suspended slabs	SM	13		
	Carried to Collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	BILL NO. 2				
	GROUND FLOOR				
	ELEMENT NO.7				
	INTERNAL FINISHES				
	COLLECTION				
		Page No			
	Total Brought forward from Page No.	14			
		15			
	Carried Forward to Summary of Bill No. 2				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	GATES				
A	Supply and fix metal double leaf gate size 3000 x 2100mm with 50 x 50 x 3mm Ms SHS horizontal and vertical members at 150cc, 100x50x3mm RHS frames including primer and paint, iron mongery and any other necessary accessories to architectural details.	No.	2		
B	Ditto 1200 x 2100mm high Side Hung Gate	No.	1		
	Carried Forward to Summary of Bill No. 2				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	SUPPORTED SHADING DECK				
	Vibrated Reinforced Concrete (Class 25/20) to:				
A	Shading deck and support	SM	89		
	Deformed high yield steel ribbed bars reinforcement to KS 573:2014 for cutting, bending, hoisting and fixing including all necessary tying wires, distance blocks, spacers, templates and stools				
B	D8	Kg.	959		
C	D10	Kg.	1,918		
	Fairfaced Monolithic Formwork to:-				
D	Soffits and sides of shading deck	SM	146		
	15mm (minimum) Two coat external render on concrete surfaces finished with a wood float to receive finishes (m/s).				
E	Concrete surfaces to receive painting	SM	146		
	Prepare and apply one coat Alkali Resistant Primer and one coat of silicone Exterior Emulsion paint in accordance with the manufacturers written instructions and to the satisfaction of the architect				
F	Rendered walls and concrete surfaces externally	SM	146		
	Carried Forward to Summary of Bill No. 2				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	BILL NO.2				
	GATE HOUSE & GATES				
	SECTION SUMMARY	Page No.			
1	SUBSTRUCTURES	5			
2	REINFORCED SUPERSTRUCTURE	6			
3	WALLING	7			
4	DOORS	10			
5	WINDOWS	12			
6	EXTERNAL FINISHES	13			
7	INTERNAL FINISHES	16			
8	GATES	17			
9	SHADING DECK	18			
	Gate House Summary Carried to Final Summary				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	PRIME COST SUMS				
	ELECTRICAL INSTALLATIONS				
A	Allow a PC sum for electrical installations to be executed by nominated sub-contractors.	Item	1		200,000.00
B	Allow for all necessary Builder's work in connection with electrical installations including cutting holes, chasing, hacking e.t.c and making good	Item	1		
C	Add for profit	%			
D	Allow for general and specific attendance	Item			
	MECHANICAL INSTALLATIONS				
E	Allow a PC sum for mechanical installations to be executed by nominated sub-contractors.	Item			200,000.00
F	Allow for all necessary Builder's work in connection with electrical installations including cutting holes, chasing, hacking e.t.c and making good	Item	1		
G	Add for profit	%			
H	Allow for general and specific attendance	Item			
	Total Carried Forward to Final Summary				

PROPOSED GATES & GATE HOUSE FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO. 2782/4 AT SNOWVIEW ESTATE- NANYUKI, LAIKIPIA COUNTY.

GATE HOUSE SUMMARY

Section	Description		Amount
1	PARTICULAR AND GENERAL PRELIMINARIES		
2	GATES & GATE HOUSE		
3	PC SUMS		
	SUBTOTAL		
4	CONTINGENCY		150,000.00
	Total Carried to Summary		

M/S

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	BILL NO.3				
	BOUNDARY WALL				
	Excavations				
A	Excavate column bases commencing from stripped level depth n.e 1.5m.	CM	390		
B	Ditto for ground beam.	CM	587		
	Disposal				
C	Remove surplus excavated material in soil heaps and cart away from site to the contractor's designated and approved dumping site	CM	977		
	Filling				
D	Approved imported soil filling rolled and compacted in layers not exceeding 150mm thick to Engineer's satisfaction.	CM	628		
	50mm Plain Concrete Blinding (Class 15) to:				
E	Column bases	SM	252		
F	Ground beam	SM	356		
	Vibrated Reinforced Concrete (Class 25/20) to:				
G	Column bases	CM	76		
H	Foundation columns	CM	51		
	Sawn cypress formwork:-				
J	Column bases	SM	1678		
K	Ditto: columns	SM	839		
	Carried to Collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	Reinforcement				
	Deformed high yield steel ribbed bars reinforcement to KS 573:2014 for cutting, bending, hoisting and fixing including all necessary tying wires, distance blocks, spacers, templates and stools.				
A	D8	Kg	4064		
B	D10	Kg	6096		
	Above Ground				
	Vibrated Reinforced Concrete (Class 25/20) to:				
C	Ground beam	CM	192		
D	Columns	CM	62		
	Deformed high yield steel ribbed bars reinforcement to KS 573:2014 for cutting, bending, hoisting and fixing including all necessary tying wires, distance blocks, spacers, templates and stools				
E	D8	Kg	8128		
F	D16	Kg	12192		
	Fairfaced monolithic formwork:-				
G	Sides of ground beam	SM	1918		
H	Sides of columns	SM	1174		
	Walling				
	Machine cut local Block stone walling, average 7.0N/mm2, bedded, jointed and pointed in cement and sand mortar (1:3) and reinforced every alternate course with 20 gauge hoop iron				
J	200mm thick walling	SM	3999		
	Carried to Collection				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	Copings				
A	250 x 50mm thick once weathered and twice throated coping.	LM	1904		
B	400 x 400 x 50mm thick precast throated and weathered concrete pier cap fixed on columns to detail	No.	699		
	Keying				
C	5mm deep horizontal and vertical recessed key pointing to masonry surfaces.	SM	3999		
	Expansion Joint				
D	20mm thick approved expansion joint filler sandwiched between concrete surfaces; with and including mastic sealant to both sides of expansion joint filer.	LM	133		
E	Supply and fix metal double leaf gate size 3000 x 2100mm with 50 x 50 x 3mm Ms SHS horizontal and vertical members at 150cc, 100x50x3mm RHS frames including primer and paint, iron mongery and any other necessary accessories to architectural details.	No.	1		
	Provision for steps				
F	Allow a provisional sum for steps	Item	1		
	Carried to collection				

PROPOSED BOUNDARY WALL GATE FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO. 2782/4 AT SNOWVIEW ESTATE- NANYUKI, LAIKIPIA COUNTY.

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	BILL NO.4				
	BOUNDARY WALL & GATE				
	COLLECTION				
	Total Brought forward from Page No.		1		
			2		
			3		
	Total Carried Forward to Final Summary				

PROPOSED BOUNDARY WALL & GATE FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO. 2782/4 AT SNOWVIEW ESTATE- NANYUKI, LAIKIPIA COUNTY.

BOUNDARY WALL SUMMARY

Section	Description		Amount
1	PARTICULAR AND GENERAL PRELIMINARIES		
2	BOUNDARY WALL & GATES		
	SUBTOTAL		
3	CONTINGENCY		1,400,000.00
	Total Carried to Summary		

M/S

PROPOSED GATE HOUSE & BOUNDARY WALL FOR NANYUKI SNOWVIEW HEIGHTS LTD ON PLOT NO. 2782/4 AT SNOWVIEW ESTATE- NANYUKI, LAIKIPIA COUNTY.

GRAND SUMMARY

Section	Description		Amount
1	GATES & GATE HOUSE		
2	MASONRY BOUNDARY WALL & GATE		
	TOTAL		
Total Project Cost			

Amount in words:-

.....

.....

.....

Date.....

Signature.....

M/S

DRAWINGS

Form No. 3

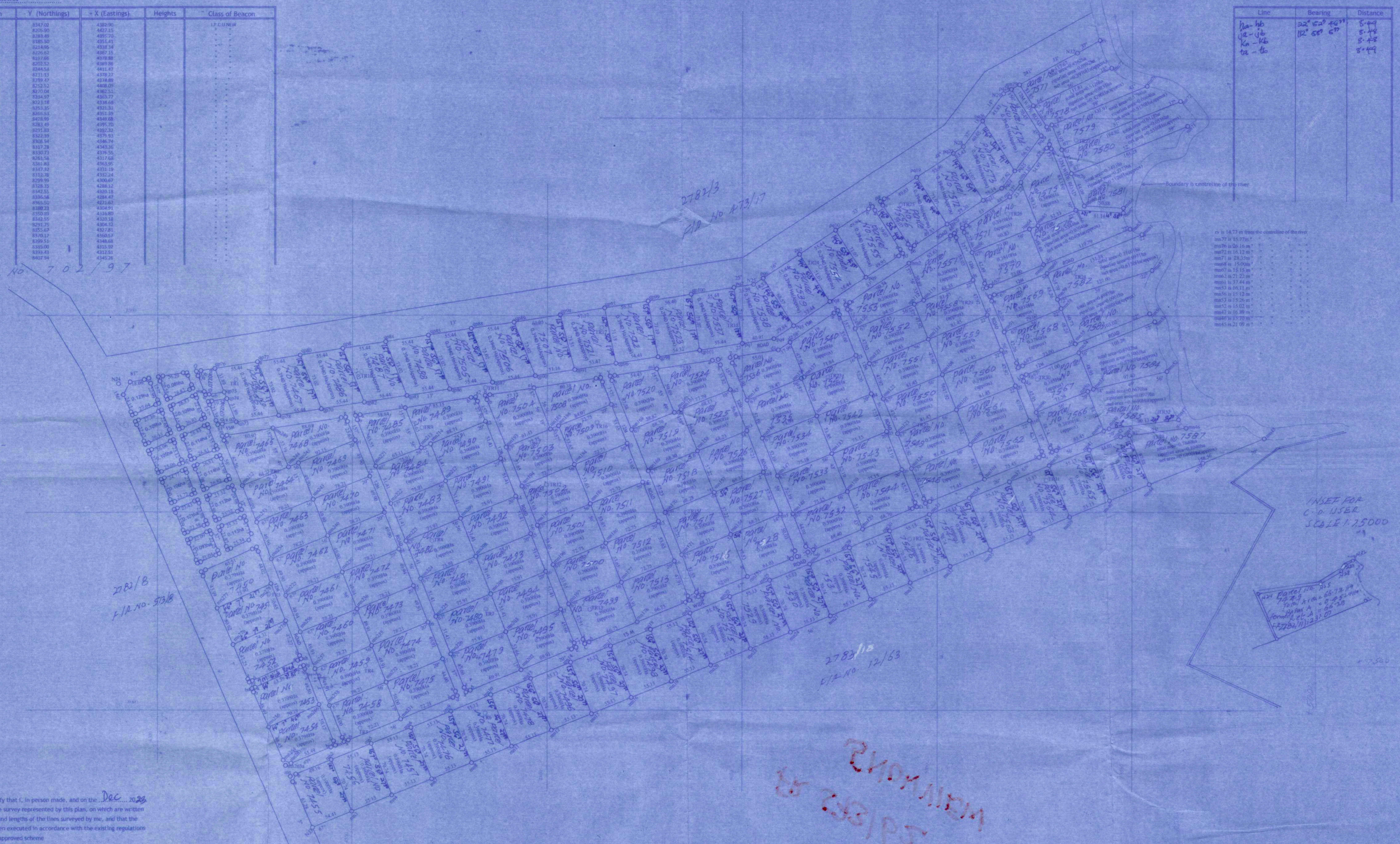
Co-ordinates Referred to Equator and 37° E

Units Metres

Station	- Y (Northings)	+ X (Eastings)	Heights	Class of Beacon
m	8347.02	4382.90		I.P.C.U.NEW
mn279a	8205.90	4427.15		" "
mn283a	8283.49	4395.70		" "
mn283a	8185.50	4351.41		" "
mn285a	8214.95	4338.34		" "
mn287a	8226.62	4367.15		" "
mn289a	8197.66	4378.88		" "
mn291a	8202.52	4389.86		" "
mn295a	8244.58	4411.47		" "
mn297a	8231.13	4378.27		" "
mn299a	8239.47	4374.89		" "
mn300a	8252.92	4408.09		" "
mn304a	8270.04	4362.51		" "
mn307a	8284.97	4363.77		" "
mn309a	8223.18	4334.68		" "
mn311a	8253.35	4321.33		" "
mn314a	8265.53	4351.39		" "
Q	8428.99	4349.68		" "
qp11a	8283.49	4395.70		" "
qp11a	8291.83	4392.32		" "
qp13a	8322.39	4379.93		" "
qp15a	8308.94	4346.74		" "
qp17a	8317.28	4343.36		" "
qp18a	8330.73	4376.55		" "
qp1a	8261.58	4317.68		" "
qp20a	8361.83	4363.95		" "
qp22a	8347.32	4331.19		" "
qp25a	8312.78	4332.24		" "
qp27a	8299.99	4300.67		" "
qp29a	8328.35	4288.12		" "
qp31a	8342.55	4320.18		" "
qp33a	8336.58	4284.47		" "
qp35a	8365.50	4271.67		" "
qp37a	8380.23	4304.91		" "
qp39a	8350.89	4316.80		" "
qp39a	8342.55	4320.18		" "
qp3a	8291.75	4304.32		" "
qp41a	8355.67	4327.81		" "
qp43a	8370.17	4360.57		" "
qp45a	8399.51	4348.68		" "
qp47a	8385.00	4315.92		" "
qp49a	8393.43	4312.51		" "
qp50a	8407.94	4345.26		" "

F/R NO 702/97

Line	Bearing	Distance
ha-hb	22° 52' 46"	8.49
ja-jb	112° 58' 6"	8.48
ka-kb		8.48
ta-tb		8.49



I hereby certify that I, in person made, and on the Dec 2023 completed the survey represented by this plan, on which are written the bearings and lengths of the lines surveyed by me, and that the survey has been executed in accordance with the existing regulations and with the approved scheme

Letter No. .... of ....

P.W. Mwangi
Surveyor

I certify that all the work performed in the field and in the office by my assistance P.W. Mwangi has been carried out under my personal directive and I take full responsibility for all work so performed

Licensed surveyor

OREYO ORARO
Land Surveyor
No. 177

F/R NO 513/18, 662/1 SCALE 1: 2,500

Registration	Transactions	Authentication	Date	Records	Date
Date Recieved 18-1-24	Provisional Approval ?	Examined by [illegible]	15/1/2024	Traced by	
File Reference CT64/48/66	Final Approval Jin Compl	Approved by	15/1/24	Compared by	
Computations No. 824.01		Authenticated by [signature] (No Linen Copy) for Director of Surveys	31/01/24	Cadastral Sheet	
Field Book No. LN.C	Charted by			R.I.M	

Folio No. 573
Register No. 62

Parcel No 7449 L.O. User
(formerly L.r. No. 2782/11)

Plot / Parcel No. Parcel No 7450-7587 (parts of 7449)

Ref. Map/ R.I.M N.A. 37/S.IV. d. 9

Registration Block NANYUKI/MARURA BLK 12

Registration District LAIKIPIA

Locality N. W. of Nanyuki T/ship