PROPOSED TOILET BLOCK IN KAREN, NAIROBI

FOR

IUCN,

________________________________________

BILLS OF QUANTITIES

________________________________________

2020
BILLS OF QUANTITIES

SUPPLIED AS PART OF THE CONTRACT FOR THE PROPOSED TOILET BLOCK IN KAREN

FOR
IUCN

The Contract for the above-mentioned Works, entered into on the _____ day of _________________ 2020 by the undersigned parties refers to these Bills of Quantities which shall be read and construed as part of the said Contract.

(SIGNATURE OF EMPLOYER)  (SIGNATURE OF CONTRACTOR)

DATE: _____________________  DATE: _____________________
SPECIAL NOTES

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 the Quantity Surveyors 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 Surveyors in order that the correct meaning may be decided upon before the date for the submission of the Tender.

2. No liability whatever 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 Surveyors 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 Contractor shall note that the VAT Act requires that Value Added Tax shall be charged on the value added in the provision of building services. The Contractor is hereby advised to allow for this requirement in his tender rates. All tender rates shall therefore be INCLUSIVE OF VAT at the applicable rate.

10. The Bills of Quantities must be priced in Kenyan currency, i.e. Shillings and Cents.
FORM OF TENDER

TENDER FOR: THE PROPOSED TOILET BLOCK FOR IUCN IN KAREN, NAIROBI.

IUCN,
P. O. Box,
NAIROBI

Sir,

I/We, the undersigned, am/are willing to contract for and complete the whole of the works in full and in accordance with the Drawings and Bills of Quantities prepared and issued by client appointed consultants, and to the their entire satisfaction for the sum stated below:

AMOUNT OF TENDER: KENYA SHILLINGS: .................................................................

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

(KSHS....................................................................................................................)

TIME OF COMPLETION

I/We, the undersigned hereby undertake to complete the contract works within ______ weeks from the Date of Possession of site.

LIQUIDATED AND ASCERTAINED DAMAGES

As page 1/13 of the Bills of Quantities will be KShs. 50,000.00 per calendar week or part thereof.

In the event of us being awarded the above works, we propose to use the following subcontractors, subject to the Architect's approval.

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FORM OF TENDER (cont'd)

PERFORMANCE BOND UNDERTAKING:

I/We, the undersigned, further undertake to provide a Surety as required under Page 1/13 of the Bills of Quantities and such Surety will, subject to approval be the following:

NAME: ........................................................................................................

ADDRESS: ......................................................................................................

TELEPHONE: ....................................................................................................

VALIDITY:

I/We, agree that this tender will remain valid for a period of 30 days from the date set for opening of Tenders.

NAME OF CONTRACTOR ............................................................

SIGNATURE OF CONTRACTOR ..............................................................

ADDRESS: ........................................................................................................

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

DATE: .............................................................................................................

TELEPHONE: ....................................................................................................

NOTE: The surety must be an Established Bank, Insurance Company or Fidelity Guarantee Corporation to the approval of the Architect and in accordance with clause 16 of the Agreement and Schedule of Conditions of Building Contract. (April, 1999 Edition).
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SECTION NO. 1 PRELIMINARIES

PRELIMINARY PARTICULARS

A. PARTIES

The “Employer” is IUCN

The “Project Manager” is

The “Architect” is

The “Quantity Surveyor” is

The “Structural/Civil Engineer” is

The “Services Engineer” is

For the purpose of the Works, which are under the control of the above Consultants, the respective Consultants shall be deemed to be vested with the duties and be representatives of the Architect.

B. SITE

The site is Plot L.R. No......................... KAREN, Nairobi.

The Contractor shall obtain the Architect’s approval for the siting of all temporary structures, spoil heaps, temporary paths and storage areas for materials.

The Contractor shall visit the Site to acquaint himself with its nature and position, the nature of the ground and other local conditions, position of power and water supplies, access or any other limitations, and no claims for extras will be considered on account of lack of knowledge in this respect.

The Contractor must obtain the Architect's approval and directions regarding the use of any materials found on the site.
A. DESCRIPTION OF THE WORKS

The works comprise demolitions and extensions to existing structures.

The building structures are in Reinforced Concrete strip foundations, Columns and column bases, load bearing walls, Concrete Beams. Walls are in machine cut and medium chisel dressed stone. The roof structure is in structural timber.

Doors are mainly flush doors and Solid hardwood doors. Door frames and Architraves are in polished hardwood for all wooden doors. All ironmongery to doors shall be supplied by the client and installed by the contractor. Windows are generally steel casement windows.

External finishes are generally key pointing and cement and sand render finished in textured paint.

The internal floor finishes are ceramic tiles. The ceilings are generally Plaster and paint to Gypsum board.

Services specialist installations include Electrical works, Plumbing and Drainage.
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 subcontractors 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 on Sundays 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 and without the prior approval of the Architect in writing.

The work must be carried out to cause minimum inconvenience to the neighborhood and adjoining premises. In particular, no hammering, mechanical drilling or other unduly noisy work may be commenced before 8.00am or continued after 6.00pm.

B. **DRAWINGS**

The drawings used in the preparation of these Bills of Quantities are scheduled in Appendix “A” at the end of these Bills of Quantities. Drawings may be inspected at the offices of the Architect or Quantity Surveyor by Prior appointment.

C. **TIME FOR COMPLETION**

There is a need to complete the work within the contract period which shall be stated by the tenderer in the form of tender. The contractor must make all due preparation and safeguards against factors such as labour disputes, fluctuating weather patterns, etc., that might slow down his progress and no claims for extras will be considered on account of his failure to do so.
CONTRACT PARTICULARS

FORM OF CONTRACT

A. The Contractor will be required to enter into a Contract which will be the current Form of Agreement and Schedule of Conditions of Building Works published by The Joint Building Council, Kenya (April 1999 Edition) excepting in so far as varied hereafter.

B. The Contractor's attention is called to the following Clauses of the Conditions of Contract which shall be read as incorporated herein and he shall allow any sums which he considers necessary for the carrying out and observance of such conditions.

C. Clause 1.0 Definitions.

D. Clause 2.0 Articles of Agreement
   The works shall be carried out on Plot L.R No. ........................ KAREN, Nairobi.
   Sub-clause 2.9 and 2.12 are subject to employers’ approval

E. Clause 3.0 General obligations of the Employer.

F. Clause 4.0 General obligations of the Contractor.

G. Clause 5.0 General obligations of the Architect.

H. Clause 6.0 General obligations of the Quantity Surveyor.

I. Clause 7.0 Contract Documents.

   The Contract Bills have been prepared in accordance with the Standard method of measurement of Building Works for East Africa, Second Edition (metric) (Second Printing) July 1989, published by the Architectural Association of Kenya, Chapter of Quantity Surveyors, which is available for inspection at the offices of the Quantity Surveyor by appointment.

K. Clause 9.0 Contractor’s Site Agent and other staff.

L. Clause 10.0 Clerk-of-Works.

M. Clause 11.0 Liability Against Injury to Persons and Property.

Preliminaries
FORMS OF CONTRACT (Continued)

A. Clause 12.0 Insurance Against Injury to Persons and Property.

The Contractor shall effect and maintain in the joint names of the Employer and the Contractor the following insurances as required by Clause 12.1.1 and 12.1.2 and shall allow for all costs thereof:

(i) Employer's Liability (Workmen’s Compensation).

(ii) Third Party (Public Liability) for an Indemnity of not less than Shs. 1,000,000.00 for any one accident or series of accidents arising from the same event (unlimited in aggregate).

Should the Contractor already hold annual Insurance covering the whole of his activities, and the Indemnity required under this contract exceeds the indemnity under the existing policy/ies, then further insurances shall be effected and maintained to cover such excess.

The Contractor shall ensure that all Sub-Contractors effect and maintain such insurances as are necessary to cover their liabilities in respect of injury to persons and property and Workmen’s Compensation.

B. Clause 13.0 Insurance of the Works (Contractor’s Liability)

To give effect to the Conditions of Contract and the requirements contained herein, the Contractor shall effect a Contractor’s All Risks Policy to cover the full value of the following and allow for all costs thereof.

(i) The Works and Temporary Works erected in performance of this Contract.

(ii) The Materials on Site, Plant and Tools.

(iii) The cost and expense of removing debris of the property insured, destroyed or damaged by any peril insured.

(iv) Professional Fees (to be allowed at 9% of the Contract Sum)

Note: Clauses 14.0 and 15.0 will be deleted.

C. Clause 14.0 Insurance of the Works (Employer’s Liability).

Note: This Clause will be deleted.

D. Clause 15.0 Insurance of Works (Works of Alterations, etc).

Note: This clause will be deleted.

E. Clause 16.0 Performance Bond.

Sub-Clause 16.2 shall be deleted.
FORM OF CONTRACT (Continued)

A. Clause 17.0 Compliance with Regulations, Notices, etc.
   The Contractor’s particular attention is drawn to the requirement to include in his tender for costs relating to the Training Levy and the Standards Levy.
   The Contractor shall include for all costs arising from Observance of these requirements in the space provided elsewhere in these Bills of Quantities.

B. Clause 18.0 Programme of Works.
   The Contractor will be responsible for arranging the programme with all Sub-Contractors including the Nominated Sub-Contractors and Nominated Suppliers.

C. Clause 19.0 Access to the Works.

D. Clause 20.0 Possession of Site and Commencement of Works.
   Note: Sub-Clause 20.2 will be amended by the addition of the words “or such other date as arises by virtue of extensions of time granted under Clause 36 of these Conditions”.

E. Clause 21.0 Leveling and setting out.

F. Clause 22.0 Architects Instructions.
   Note: Sub-Clause 22.5 will be amended to read “Any instructions given directly by the Employer to the Contractor shall be of no immediate effect but the Contractor shall request the Architect for confirmation within seven days, failing which the Contractor shall confirm the same in writing in the same manner as is provided for in Sub-Clause 22.4. If confirmed by the Contractor, such instructions shall be deemed to be Architect’s instructions”.

G. Clause 23.0 Specification of goods, materials and workmanship.

H. Clause 24.0 Samples and Tests


J. Clause 26.0 Assignment.

K. Clause 27.0 Sub-letting.

L. Clause 28.0 Suspension of Works by the Architect.

M. Clause 29.0 Suspension of Works by the Contractor.

Carried to Collection Shs.
A. Clause 30.0 Variations.

Note: Sub-Clause 30.14 will be amended by changing “0.01%” to read “0.10%”.

Daywork Rates:

Any Daywork ordered under Sub-Clause 30.6.3 shall be executed at the following rates:

Labour: The Prime Cost to which *_________________________ per centum shall be added.

Materials: The Prime Cost (delivered to Site) to which *_______________ per centum shall be added.

Plant: The Nett Hire Charge to which *____________________ per centum shall be added.

These percentage additions shall cover all insurances, use of small tools and non-mechanical plant, sharpening tools, water, supervision, watching, power and lighting, establishment and overhead charges and profit.

Dayworks will be allowed only where specifically ordered by the Architect in writing.

All Daywork Sheets must be signed by the Architect and the Contractor or their authorized representatives.

B. Clause 31.0 Nominated Sub-Contractors.

The Contractor will be required to ensure that all Nominated Sub-Contractors enter into the Sub-Contract Agreement issued under the authority of the Kenya Association of Building and Civil Engineering Contractors and as amplified or varied hereinafter and he must deposit with the Quantity Surveyor a signed extract of the relevant details thereof.
A. Clause 32.0  Nominated Suppliers.

The Contractor will not receive any cash, trade or other discounts on Prime Cost and Provisional Sums. Any profit in lieu of these discounts which the Contractor desires must be priced by him against the appropriate item provided in the Bills of Quantities.

When tendering for works covered by Prime Cost and Provisional Sums the Contractor will be treated as any other Nominated Supplier or Sub-Contractor.

The Employer reserves the right to pay direct on the Certificates of the Architect some or all accounts in respect of works and materials covered by Prime Cost and Provisional Sums due to Nominated Sub-Contractors or Nominated Suppliers and to deduct any amounts so paid from any sums otherwise payable to the Contractor, should this reservation be adopted due to default on part of the Contractor, any profits which the Contractor may have allowed on Prime Cost and Provisional Sums will be omitted from the Contract. Direct Payment will not be deemed to construe omission of the work from the Contract and the Contractor will continue to be responsible for the work or goods in accordance with the terms of the contract.

B. Clause 33.0  Work by other Persons engaged by the Employer.

C. Clause 34.0  Payments.

Sub-Clause 34.14 will be deleted.

Sub-Clause 34.28 will be amended by addition of the words:

“Any amount of such penalties or fines shall be added to the Contract price, and if an interim certificate is issued after imposition of such penalties or fines, any such amount shall be added to the amount which would otherwise be stated as due in such a certificate”.

D. Clause 35.0  Fluctuations

This is a Fixed price Contract

Sub-Clauses 35.3 to 35.8 will be deleted.

E. Clause 36.0  Extension of time.

F. Clause 37.0  Loss and Expense caused by Disturbance of Regular Progress of the Works.
FORM OF CONTRACT (Continued)

A. Clause 38.0 Termination of the Contract by the Employer.

B. Clause 39.0 Termination of the Contract by the Contractor.

C. Clause 40.0 Termination of the Contract by either party.

D. Clause 41.0 Practical Completion and Defects Liability.

E. Clause 42.0 Sectional Completion.

F. Clause 43.0 Damages for Delay in Completion.

   Sub-Clause 43.1 will be amended by the addition of the words: -
   “The certificate to be copied to the Contractor”

G. Clause 44.0 Antiquities and other Objects of value.

H. Clause 45.0 Settlement of Disputes.
APPENDIX TO THE CONDITIONS OF CONTRACT

The Appendix to the Conditions of Contract will be filled as follows:-

13.1.1 Percentage to cover Professional Fees for Insurance Purposes only 9%

16.1 Name of Contractor’s Surety To be inserted by the Tenderer in the Form of Tender

16.1 Amount of Surety 10%

16.2 Name of Employer’s Surety Not Applicable

16.2 Amount of Surety Not Applicable

18.1 Period for Submission of Programme Within 14 Days after Award of Contract.

20.1.1 Period for possession of site To be decided by the Architect within 14 days of receipt of notice of acceptance of Tender.

20.2 Date for commencement of Works To be decided by the Architect within 14 days of receipt of notice of acceptance of Tender.

20.1.2 Date for practical completion To be determined after acceptance of Tender.

31.14) 32.4.5) Name of Bank for purposes of Interest calculation To be inserted by the Tenderer in the Form of Tender.

34.1 Interval for application of payment certificates Monthly

34.4 Minimum amount of payment certificate Not Applicable

34.12 Percentage of certified value retained 10%

34.12 Limit of retention fund 5%

34.15 Period of release of interest on retention money to Contractor Not Applicable

34.17 Period of final measurement and valuation Six Months

41.6 Defects liability period Six Months

43.1 Damages for delay in completion At the rate of KShs. 50,000.00 per Week or part thereof.

Carried to Collection Shs.
GENERAL MATTERS

A. SUFFICIENCY OF TENDER

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his Tender for the Works and of the rates and prices stated in the priced Bills of Quantities, which rates and prices shall cover all his obligations under the Contract and all matters and things necessary for the proper completion and maintenance of the Works.

B. STAMP CHARGES

The Contractor shall allow for the payment of all Stamp Charges in connection with the Surety Bond.

C. DEFINITIONS AND ABBREVIATIONS

Terms used in these Bills of Quantities shall be interpreted as follows:

"Approved" shall mean approved by the Architect.

"as directed" shall mean as directed by the Architect.


"C.M." shall mean Cubic Metres.

"S.M." shall mean Square Metres.

"L.M." shall mean Linear Metres.

"MM" shall mean Millimetres.

"KG." shall mean Kilogrammes.

"NO." shall mean Numbers.

"DITTO" shall mean the whole of the preceding description except as qualified in the description in which it occurs.

D. FIGURED DIMENSIONS

Figured dimensions are to be followed in preference to dimensions scaled from the Drawings; but whenever possible dimensions are to be taken on the Site or from the Buildings. Before any work is commenced by Sub-Contractors or Specialist Firms, dimensions must be checked on the Site and/or buildings and agreed with the Contractor, irrespective of the comparable dimensions shown on the Drawings. The Contractor shall be responsible for the accuracy of such dimensions.
GENERAL MATTERS (Cont’d)

A. PROVISIONAL WORK

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 measurement, 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 the work at his own expense to enable the measurements to be taken.

B. PROGRESS PHOTOGRAPHS

The contractor shall be required to submit to the Architect progress Photographs in soft form every two weeks, showing progress achieved to various sections of work. The contractor must allow for this requirement here or in his tender rates.

C. RECORDS

The contractor shall be required to keep all relevant records to the works and shall maintain on site a diary recording weather conditions, rainfall, visitors, plant, workforce to site, e.t.c., and such report and record shall be submitted to the Architect at every site meeting.

D. PLANT, TOOLS AND SCAFFOLDING

The Contractor shall provide all necessary hoists, tackle, plant, vehicles, tools and appliances of every description for the due and satisfactory completion of the Works and shall remove same on completion.

The Contractor shall provide, erect and maintain all temporary scaffolding, sufficiently strong and efficient for the due performance of the Works, including Sub-Contract Works, provide special scaffolding as and when required during the Works and remove on completion and make good.

Such scaffolding shall be constructed of tubular steel or timber of sufficient scantlings and be provided with planked footways and guard-rails to approval.

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 altered or adapted during the Contract as may be necessary to comply with any amendments in or additions to such regulations.

Scaffolding is not measured hereinafter, and the Contractor must allow here or in his rates for the above

E. EXISTING SERVICES

Prior to commencement of any work the Contractor is to ascertain from the relevant Authorities the exact position, depth and level of all existing electric cables, water pipes or other services in the area and he shall make whatever provisions may be required by the Authorities concerned for the support and protection of such services. Any damage or disturbance caused to any services shall be reported immediately to the Architect and the relevant Authority and shall be made good to their satisfaction at the Contractor's expense.

Carried to Collection Shs.
A. **PERMANENT DIVERSION OF EXISTING SERVICES**

If in the opinion of the Architect and/or competent Authority or Employer it should become necessary to permanently remove or realign any existing pipes, sewer, field drain, cable, ditch, or other service, other than allowed for in the Bills of Quantities, the contractor shall obtain permission, where necessary from the competent Authority or Employer and shall carry out and complete the work to the satisfaction of the Architect and such Authority or Employer. Payment for such additional works will be made in accordance with the Conditions of Contract, provided always that the necessity for such permanent diversion has not arisen due to the fault of the Contractor.

In the event of the Employer or responsible Authority electing to arrange for the permanent diversion of an existing service, the permanent diversion of which has become necessary due to the fault of the contractor, the contractor shall pay the cost of the said work within a reasonable period of the account being presented. The Employer reserves the right to settle the account and deduct the sum paid by him from monies due or which may become due to the contractor.

B. **PERMANENT SUPPORT FOR EXISTING SERVICES, E.T.C**

If in the opinion of the Architect and/or competent Authority or Employer it should become necessary to provide permanent support for any existing pipe, sewer, cable, structure or any other thing disturbed or exposed during or after the execution of the works, the contractor shall carry out promptly such additional works as the Architect may require to provide such permanent support. Payment for such additional work will be made in accordance with the conditions of contract, provided always that the necessity for such permanent support has not arisen due to the fault of the contractor.

C. **TRANSPORT TO AND FROM THE SITE**

The Contractor shall include in his prices for the transport of materials, workmen, etc., to and from the Site of the proposed Works, at such hours and by such routes and means as are permitted by the Authorities.

D. **PUBLIC AND PRIVATE ROADS, PAVEMENTS, ETC.**

The Contractor will be required to make good, at his own expense, any damage he may cause to the present road surfaces and pavements within or beyond the boundary of the Site, during the period of the Works. In particular, all existing trees, shrubs, plants, etc., which may be destroyed or damaged during the progress of the Works are to be made good by the Contractor to the approval of the Architect.

E. **POLICE REGULATIONS**

The Contractor is to allow for complying with all instructions and regulations of the Police Authorities.

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Carried to Collection  Shs.
GENERAL MATTERS (Cont’d)

A. CONTRACTORS’ SUPERINTENDENCE

The Contractor shall constantly keep on the Works a literate English-speaking Agent or Representative, competent and experienced in the kind of work involved, who shall give his whole time to the superintendence of the works. Such Agent or Representative shall receive on behalf of the Contractor, directions and instructions from the Architect and such directions and instructions shall be deemed given to the Contractor in accordance with the Conditions of Contract. The Agent shall not be replaced without the specific approval of the Architect.

It is to be a specific condition of this Contract that the successful Tenderer shall provide on site throughout the period upto the Date for Practical Completion a suitably qualified, experienced and competent person to ensure that the works are carried out to the standard required by the specification and detailed on the Drawings; and shall ensure that upon any termination of employment a suitable replacement is found.

Before the Tenderer's offer is accepted the Architect will personally interview the Contractor's proposed Representative. A curriculum vitae of past experience and qualifications must be provided for the Architect's scrutiny.

The Architect's decision will be final regarding the suitability of the proposed Representative.

B. LANGUAGE OF CORRESPONDENCE AND RECORDS

All communication from the contractor to the Architect shall be in the English language.

All books, time sheets, records, notes, drawings, specifications and manufacturers literature e.t.c shall be in the English language. If any of the aforementioned were in another language, a certified translation in English shall be submitted to the Architect.

C. WATER

All water shall be fresh, clean and pure, free from earthy vegetable or organic matter, acid or alkaline substance in solution or suspension.

The Contractor shall provide at his own risk and cost all water for use in connection with the Works (including the work of Sub-Contractors), including all temporary distribution pipes, storage tanks, meters, etc. The meter shall be transferred to the employer upon completion of works. All other temporary distribution pipes and tanks shall be cleared away upon completion of the Works.

D. LIGHTING AND POWER

The Contractor shall provide at his own risk and cost all artificial lighting and power for use on the Works, including all Sub-Contractors' and Specialists' requirements and including all temporary connections, wiring, fittings, etc., and clearing away on completion. The Contractor shall pay all fees and obtain all permits in connection therewith.

Carried to Collection  Shs.
A. SAFETY

The Contractor shall comply at all times with the requirements of the Factory Act (Cap 514), Building Construction Rules, Supplement 18, Legal Notice No. 40 dated 5th April, 1984 and ensure that the safety of his workpeople and authorized visitors to the Site is protected at all times. In particular there shall be proper provision of planked footways and guard-rails to scaffolding, etc., protection against falling materials and tools and the Site shall be kept tidy and clear of dangerous rubbish.

The Contractor shall appoint a Safety Officer as required by the Factory Act and notify the Factory Inspector of his name. The Safety Officer shall be on site at all times and all directions given by the Architect to the Safety Officer shall be deemed to be Architect’s Instructions, and shall be complied with promptly without additional cost to the contract.

The Architect shall be empowered to suspend work on the Site should he consider these conditions are not being observed, and no claim arising from such a suspension will be allowed.

The contractor shall submit with his programme of works a workable procedure to be implemented in the event of an emergency for evacuation of injured personnel.

The contractor shall provide adequate struts, props, braces and the like to properly shore up unstable existing and new structures, including trenches or pits more than 1500mm deep.

The contractor will be required to maintain all construction equipments and machinery in good order in compliance with their designated noise and fume emission levels.

The contractor shall take all necessary steps within his disposal to ensure that nuisance caused by dust and noise during construction is reduced to absolute minimum.

The contractor shall maintain on site a full first aid kit for the management of injuries before arrival of or referral to qualified medical attention. A record of all notified injuries shall be kept on site and made available to the Architect.

B. PROTECTIVE CLOTHING

The Contractor shall provide all protective or any other special clothing or equipment for his employees that may be necessary.

This shall include, inter-alia, safety helmets, gloves, goggles, earmuffs, gumboots, overalls, etc. according to the type of work. The Contractor shall ensure that safety helmets are worn by all staff on site at all times.

Overall shall have the contractor’s company name at the back and all workmen shall be required to have name tags with their names and I.D numbers clipped on the overalls at all times.
MATERIALS AND WORKMANSHIP

A. GENERALLY

All materials shall be new unless otherwise directed or permitted by the Architect and in all cases where
the quality of goods or materials is not described or otherwise specified, is to be the best quality
obtainable in the ordinary meaning of the word “best” and not merely a trade signification of that word.

All materials and workmanship shall, unless otherwise specified or described, conform to the
appropriate British Standards Institution Specification current at the date of Tender.

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 such materials are on Site when required for use in the Works.

The Contractor shall be responsible for and shall replace or make good at his own expense any
materials lost or damaged.

The Works throughout shall be executed by skilled workmen well versed in their respective trades.

B. REJECTED WORKMANSHIP OR MATERIALS

Any workmanship or materials not complying with the specific requirements or approved samples or
which have been damaged, contaminated or have deteriorated, must immediately be removed from the
Site and replaced at the Contractor's expense, as required.

C. PROPRIETARY MATERIALS

Where proprietary materials are specified herein-after, the Contractor may propose the use of materials
of other manufacture but equal quality for approval by the Architect.

All materials and goods, where specified to be obtained from a particular manufacturer or supplier are
to be used or fixed strictly in accordance with their instructions.

D. SAMPLES

The contractor shall furnish at the earliest possible opportunity before work commences and at his own
cost, any samples of materials or workmanship that may be called for by the Architect for his approval
or rejection and any further samples in the case of rejection until such samples are approved by the
Architect and such samples, when approved shall be the minimum standard for the work to which they
apply.

E. CONCRETE TESTS

Concrete test cubes, i.e. per set of three as later described, including testing fee, labour and materials,
making moulds, transport and handling, etc.

Successful tests only (PROVISIONAL):

Sets of three: No. 50 @ Shs: ____________________

(Tenderer must insert rate and extend)

Carried to Collection Shs.
TEMPORARY WORKS

A. OFFICE AND SHEDS

The Contractor shall erect and maintain temporary office accommodation for his own use, and ample temporary watertight sheds for the proper storage and protection of materials and for the use of artisans and remove when ordered. Floors of sheds shall be at least 150 mm above ground level.

B. OFFICES AND SERVICES FOR THE ARCHITECT

The Contractor shall provide, erect and maintain where directed on the site, an approved weather and sun-proof lock-up office for the sole use of the Architect and his representatives with a total floor area of not less than 40 square meters. The office shall be constructed with stone, concrete or wood floor and the walls and ceilings internally lined with approved fibreboard.

Glazed windows of not less than 1.5 square meters and a stout door with lock and fastenings shall be provided and the office furnished with wooden stools, tables and chairs and drawing table along the full length of one side, complete with drawers of sufficient size to carry the Drawings laid flat.

The Contractor shall also provide, erect and maintain a lock-up European-type latrine for the sole use of the Architect and his representatives and to the satisfaction of the Local Authorities and shall provide the services of a sweeper, pay all charges and keep both office and latrine in a clean and sanitary condition during the whole period of the Works.

The office and latrine shall be removed on completion.

The Contractor shall keep on site and maintain in good condition one dumpy or quickset level and leveling staff, and one 30 meter steel tape for the use of the Architect and his representatives.

C. TELEPHONE

The Contractor shall provide a telephone connected to the Town Exchange for the period of the Works, and shall pay all fees and rental for same. The telephone connection shall remain on site upon completion of the Works and shall then pass free of charge into the ownership of the Employer.

D. SANITATION

The Contractor shall provide the necessary latrines for his staff and workmen to the requirements and satisfaction of the Health Authorities and maintain the same in a thoroughly clean and sanitary condition and pay all conservancy fees during the period of the Works and remove when no longer required.
TEMPORARY WORKS (Cont’d)

A. EXISTING AND ADJACENT PROPERTY

The Contractor must take all steps necessary to safeguard existing and adjacent property, make good at his own expense any damage to persons or property caused thereon, and hold the Employer indemnified against any such claim arising.

The Contractor will be held fully responsible for the safety of the existing and adjacent buildings and for any damage caused in consequence of these Works. He must reinstate all damages at his own expense and indemnify the Employer against any loss.

The Contractor must take such steps and exercise such care and diligence as to minimize nuisance from dust, noise or any other cause to the occupiers of the existing and adjacent property.

B. HOARDING

The contractor shall enclose the site with a hoarding with opening and gates as required, constructed of substantial timbers to approval and covered with new 2400mm high galvanized iron sheeting painted to approval.

C. WATCHING AND LIGHTING

The Contractor shall provide at his own risk and cost all watching and lighting as necessary to safeguard the Works, plant and materials against damage and theft.

D. TEMPORARY ROADS

The Contractor shall provide where directed all temporary access routes, tracks and paths necessary for the execution of the Works, including making good when no longer required.

E. SIGNBOARD

The Signboard and lettering on same for the display of the General Contractor and Sub-Contractors’ names shall be of an approved size with the Employer’s name painted thereon. The Architect’s, Quantity Surveyor's and other Consultants’ names shall be printed in 50 mm letters all to the Architect’s design. No other signboard or advertising will be permitted.

The signboard shall be well maintained throughout the construction period and removed upon completion.

Carried to Collection Shs.
NOMINATED SUB-CONTRACTORS AND SUPPLIERS

(See also under FORM OF CONTRACT Clauses 31.0 and 32.0)

A. NOMINATED SUB-CONTRACTORS

The Contractor shall be responsible for Nominated Sub-Contractors in every respect and in particular it shall be the Contractor’s responsibility to ensure that each Sub-Contractor commences and completes the work in such manner and is ready on the Site with his materials, labour and special plant at such times so as to conform with the Progress Schedule, as specified previously, and to ensure satisfactory progress.

The Contractor shall also accept liability for and bear the cost of General Attendance on Nominated Sub-Contractors which shall be deemed to include for:

- Allowing the use of standing scaffolding, maintenance and alteration of all scaffolding, retention of all scaffolding until such time as all relevant Sub-Contractors’ works are complete and removal of all scaffolding on completion.
- Providing space for office accommodation, and for storage of plant and materials; allowing use of sanitary accommodation; the supply of all necessary water, and lighting; and clearing away all rubbish.

The items for "General Attendance" given herein-after following Prime Cost Sums in respect of Sub-Contractors' work shall be deemed to include all the above.

The Contractor shall also accept liability for and bear the cost of Special Attendance on Nominated Sub-Contractors which shall include for one or more of the following:

- Unloading, storing, hoisting and placing in position, providing power, provision of special scaffolding.

The items for "Special Attendance" given herein-after following Prime Cost Sums shall include any one or more of the above items as set out in the particular reference.

Cutting away for and making good after the work of Sub-Contractors as may be required will be measured and valued separately by the Quantity Surveyor.

B. NOMINATED SUPPLIERS

The Cost of "Fix Only" materials to be obtained from Nominated Suppliers which are covered by Prime Cost or Provisional Sums shall include for taking delivery where directed, checking with invoices or indents, reporting and claiming damages for shortages and damaged goods, defraying demurrage, signing for as having been received in good order, transporting, unloading, storing, covering and protecting until the time of fixing, unpacking, replacing anything lost or damaged, sorting, assembling, hoisting to required levels and fixing as described.

Before placing any orders with Nominated Sub-Contractors or Nominated Suppliers the Contractor must ascertain that the terms and conditions of the quotations and the dates of delivery of materials or execution of works comply with the terms of Contract and the Progress Schedule.
A. **PRIME COST RATES**

Where description of items includes a Prime Cost rate per unit this rate is to cover the *nett* supply cost of the unit only. The Contractor's price must include for the cost of the unit at the rate stated, plus waste, taking delivery, storage, fixing in position, profit and overheads.

The actual *nett* cost per unit will be adjusted within the Final Account against the Prime Cost rate stated.
PROTECTION AND CLEANING

A. PROTECTION

The Contractor shall cover and protect from damage, including damage from inclement weather, all finished work and unfixed materials, including that of Sub-Contractors, etc., to the satisfaction of the Architect until the completion of the Contract, and carefully preserve all trees or bushes on or near the Site.

B. CLEANING

The Contractor shall, upon completion of the Works, at his own expense, remove and clear away all surplus excavated materials, plant, rubbish and unused materials and shall leave the whole of the Site and Works in a clean and tidy state to the satisfaction of the Architect, including clearing away and making good all traces of temporary access roads, offices, sheds, camps, etc. Particular care shall be taken to leave clean all floors and windows and to remove all paint and cement stains. He shall also, at the discretion of the Architect, remove all rubbish and dirt as it accumulates. The Contractor is to find his own dump and shall pay all charges in connection therewith.

C. CONTINGENCIES

Provide a Provisional Sum as indicated in the summary page for Contingencies to be omitted or expended in whole or in part at the discretion of the Architect.

D. TRAINING LEVY

The Contractor's attention is drawn to Legal Notice No. 237 of October, 1971, which requires payment by the Contractor of Training Levy on all Contracts of more than Shs.50,000/- in value and his Tender must include for all costs arising or resulting therefrom.

E. STANDARD LEVY

The Contractor's attention is drawn to Legal Notice No. 267 of 22nd June, 1990 which requires payment by the Contractor of Standard Levy. His tender must include for all costs arising or resulting therefrom.

F. VALUE ADDED TAX

The Contractor's attention is drawn to the Finance Bill dated June, 1993 which stipulates that the Value Added Tax shall be charged on the value added in the provision of building services.

The Contractor shall include Value Added Tax (V.A.T) at the Applicable rate in his Tender rates. ALL Rates shall therefore be **inclusive** of V.A.T.
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GENERAL DESCRIPTION OF MATERIALS AND WORKMANSHIP

The following apply to all Sections hereafter.

A. ALTERATIONS, ADDITIONS AND EXTENSIONS

In alterations or extensions to existing buildings and/or external works, new work is to match up in all respects to the existing work unless otherwise specified, shown on the Drawings or approved beforehand by the Architect.

QUALITY, SAMPLES, TESTING AND APPROVAL

B. MATERIALS

Materials, commodities, components and equipment are to be new and unused unless otherwise specified. Handle, store, fix and protect all commodities with care to ensure that they are in perfect condition when incorporated into the work and handed over on completion.

C. MANUFACTURER'S RECOMMENDATIONS

Handle, store and fix every commodity strictly in accordance with the printed or written recommendations of the manufacturer and/or supplier. Supply the Architect with copies of manufacturers' recommendations. Inform the Architect if the manufacturers' recommendations conflict with any other specified requirements, and obtain his instructions before proceeding.

D. STANDARDS

Where commodities or workmanship are specified by reference to British Standards (B.S.) or Codes of Practice (C.P.) or International (I.S.O.) or other Standards, such standards are deemed to be the latest published at the time of tendering. The Contractor will be deemed to have read and understood the standards specified, and no claim for want of knowledge will be allowed. The substitution of commodities or standards of workmanship complying with other standards may be allowed at the discretion of the Architect, but application for permission for such substitution must be made in writing in sufficient time to allow adequate investigation. Obtain Certificates of Compliance with standards and supply to the Architect on request.

E. LOCAL CONDITIONS

All materials, commodities, components and equipment must be suitable for use in tropical climates.

F. SAMPLES

Where samples of commodities or specimens of finished work are specified, submit samples or specimens to the Architect and obtain his approval before confirming orders or carrying out the work. Retain approved samples and specimens on Site for comparison with the finished work. Finished work must conform in all respects with the samples or specimens approved. Remove samples and specimens when no longer required. The cost of supplying samples and specimens must be borne by the Contractor, but specimens may form part of the finished work where approved by the Architect.

Preambles
**GENERAL DESCRIPTIONS OF MATERIALS AND WORKMANSHIP**

The following apply to all Sections hereinafter

**DEMOLITIONS AND ALTERATIONS**

A. **GENERALLY**

The Contractor is required to visit the existing buildings and ascertain for himself the nature of the Works and no claim arising from lack of knowledge in this respect will be entertained. The dimensions and quantities given in this section are approximate and the Contractor is referred to the Site to ascertain the exact nature and extent of the Works.

The items of pulling down and alterations are to include for both labour and materials and for any shoring, needling and strutting and temporary works in connection therewith. The Contractor must allow in his pricing for making good all works disturbed in all trades and for carting away all rubbish.

The Contractor must give all the necessary notices and must exercise due care in the demolitions. He must not collapse large sections of walls, floors, etc., and must provide all necessary shoring and supports during the demolitions.

During demolition works the Contractor shall keep the debris constantly watered to minimise the dust arising and this shall be included in his prices.

All materials arising from the demolitions, unless specifically stated otherwise, are to become the property of the Contractor and any credit allowed for the value of such materials shall be shown in the space provided. All materials, including rubbish, shall be removed from the Site as soon as possible.

The Contractor is to erect dust-proof screens to the approval of the Architect where deemed necessary and to remove them on completion of the work, all to the Architect's satisfaction.

B. **INTERPRETATION OF TERMS**

"Demolish" shall be deemed to mean cutting away, breaking up, demolishing, pulling down, taking down, removing, etc., as the context requires and shall include in all cases temporarily strutting and supporting and making good remaining work as necessary, and clearing away and removing from Site all debris, etc.

"Remove" shall mean taking down, hacking up, breaking down, removing etc., and clearing away from Site and all other expenses thereby entailed.

"Make good" shall be deemed to mean all making good, fitting, facing up, plastering, paving, repairing and painting to match and jointing to remaining existing work.

To "match" shall mean to be equal to relevant existing work in design, workmanship and all other respects.

"Re-fix" shall apply to existing materials arising from the Works and shall mean take from store and fix in new position, including making good, repairing and adjusting as necessary.

Preambles
Demolitions and Alterations

A. UNDERPINNING

1. FOUNDATIONS

The following sequence of construction will be followed for any underpinning work to foundations:

a) Excavate under foundation footing to a length of 1000 mm by 500 mm wide by 500 mm deep, 2000 mm centres.

b) Fill the excavated cavity with concrete mix 1:3:6.

c) Allow the concrete to set for two days.

d) Repeat the above operation for the next panels until the whole foundation is underpinned.

e) Break off the projecting foundation and leave flush with mass concrete surface.

2. SUPPORT TO EXISTING SLAB

a) Prop up the first floor slab next to the wall to be demolished until new walling or column is built to carry universal beam.

b) Erect in position universal beam to support existing slab as designed.

c) Remove props seven days after erection of the beam.

Preambles
EXCAVATIONS

A. EXAMINE THE SITE

The Contractor is assumed to have examined the Site carefully and ascertained for himself its nature and the kind of materials to be excavated.

B. EXCAVATIONS

Excavations shall be to the widths and depths indicated on the Drawings or to such lesser or greater depths as the Architect may deem necessary and so instruct the Contractor in order to obtain satisfactory foundations.

Any difference in the quantity of work actually executed under such instructions and that provided in the Bills of Quantities shall be measured and valued by the Surveyor as a Variation under the relevant Conditions of Contract.

If, however, the Contractor excavates to any greater depths or widths than are shown on the Drawings or directed, then the Contractor shall, at his own expense, satisfactorily fill in such extra depth and width with concrete similar to that described for foundations.

C. BOTTOMS OF EXCAVATIONS TO RECEIVE FOUNDATIONS

The Contractor shall report to the Architect when secure bottoms to the excavations have been obtained.

Any concrete or other work executed before the excavations have been inspected and approved shall, if so directed, be removed and new work substituted after the excavations have been approved, all at the Contractor's expense.

The surface of the bottoms to excavations to receive foundations shall be levelled or graded to falls as required.

D. SIDES OF EXCAVATIONS

Sides of excavations shall be maintained vertical by means approved by the Architect, and the Contractor shall also allow for keeping same free from fallen materials in his rates for excavations.

The Contractor shall also allow for keeping excavations free from water and mud by baling, pumping or otherwise, in his rates for excavations.

E. ROCK

Excavation in rock shall exclude all material which can be removed by hand and does not necessarily require the use of compressors or other mechanical equipment although the Contractor may use such equipment to loosen the material for ease of its removal. All top soils, black cotton and other clay soils, murrum, stone and other fill and all similar materials will NOT be classified as rock.

Rock has been measured hereafter as extra over excavation for excavating in soft or hard rock.

Soft rock shall be deemed to mean any material which cannot reasonably be removed without the use of mechanical plant such as rippers, compressors, traxcavators, but which does not require drilling, wedging or blasting. Local tuffs, magadi highly-consolidated laterite, weathered lavas, boulders or outcrops of harder rock not exceeding one cubic metre in volume, Nairobi building stone and similar material shall be classified as soft rock.

Preambles
Excavations
ROCK (Cont'd)

**Hard rock** shall be classified as material which is massive and geologically homogeneous and which requires the use of drilling, wedging or blasting for its removal such as blacktrap or similar material.

The Engineer's decision shall be final with regard to the classification of excavated materials.

A. **STARTING LEVEL**

Unless otherwise described the starting level of all excavations has been measured from the level remaining after completion of reduced level excavation. However, the Contractor's prices should include for carrying out the excavation work in any alternative sequence that he may require.

B. **BLASTING**

No blasting will be permitted without the prior approval of Local Authorities and the Architect.

C. **CART AWAY**

All surplus excavated materials where so directed and all rubbish are to be removed from the Site and the Contractor is to find his own dump and shall pay all charges.

D. **BORROW PITS**

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

E. **FILLING OBTAINED FROM THE EXCAVATIONS**

Filling obtained from surplus excavated materials will only be incorporated if suitable material arises and is to be free from all weeds, roots, vegetable soil or other unstable materials and is to be filled in layers each of not more than 250 mm finished thickness. Each layer to be well wetted and consolidated as described hereafter.

F. **HARDCORE FILLING**

Hardcore for filling under floors, etc., shall be good hard stone ballast or quarry waste to the approval of the Architect broken to pass not greater than a 150 mm ring or to be 75% of the finished thickness of the layers being compacted, whichever is the lesser. Hardcore shall be free from all weeds, roots, vegetable soil, clay, black cotton soil or other unstable materials.

It shall be well graded with smaller stones and fine materials to give a dense compact mass after consolidation. Sufficient fine material shall be added to each layer to give gradation of material as necessary to obtain a solid compact mass after rolling. Hardcore filling is to be laid in layers each of a consolidated thickness not exceeding 250 mm. Each layer shall be compacted by at least 8 passes of a 10 tonne smooth-wheeled roller or a 2 tonne vibrating roller until all movement ceases. Sufficient water is to be added to obtain maximum compaction to the Architect's approval. To each layer a 25 mm thick layer of sand complying with the specification for fine aggregate for concrete shall be spread over the surface and forced into the hardcore by the use of a vibrating roller weighing not less than 2 tonnes; this operation should be carried out when the materials are dry and repeated whilst the sand is well watered. Should all the sand be absorbed the Architect may require a further layer to be applied and the process repeated.

Preambles
Excavations

HARDCORE FILLING (Cont’d)

The top surface of the hardcore shall be levelled or graded to falls as required, and shall then be blinded with a layer of similar material broken to 25 mm gauge and finished with a 10 ton smooth-wheeled roller. The surface so obtained shall be to the Architect’s approval.

A. MATERIALS FOUND IN EXCAVATIONS

No sand, aggregate, murram or other material found in the excavations is to be used in the Works without the written permission of the Architect.

B. RATES FOR EXCAVATIONS

The rates for excavation, including excavation in rock, MUST INCLUDE for trimming, levelling and preparing bottoms and all faces to receive concrete, etc., and for any extra excavation required for planking and strutting.

Prices shall include for excavating in any material encountered unless specifically otherwise described, handling, etc., of extra bulk after excavating, or before consolidating, any extra excavation required for formwork or planking and strutting, circular work, grubbing up any old drains, roots, etc., that may be encountered, for trimming sides and levelling and ramming bottoms, forming steppings and trimming excavation or filling to embankments and batters as required.

In his prices for the item “Allow for keeping the whole of the excavations free from water” the Contractor shall allow and make provision for keeping the whole of the Works thoroughly drained and clear of water below the lowest level of any part of them so long as may be required and if considered necessary by the Architect, continuously day and night by petrol or hand pumps or other mechanical appliances, pipes, chutes, dams, manholes, sumps, diversions or any other means necessary for that purpose. Water pumped from the trenches shall not be allowed to run down the road channels but shall be conveyed to the nearest surface water sewer, ditch or river through troughs, chutes or pipes.

C. RATES FOR DISPOSAL

Rates for disposal of excavated material are to include for the selection of spoil as it arises and for all double handling and re-excavation from spoil heaps not specifically ordered by the Architect.

D. DIOTHENE SHEETING

Diothene sheeting shall be 500 gauge or 1000 gauge as shown, and as produced by Plastics Africa Limited, or other equal and approved. Joints in sheeting shall be treble folded with 150 mm fold and taped at 300 mm intervals with 50 mm wide black plastic adhesive tape as manufactured by Cellotape Limited. The sheeting shall not be stretched but shall be laid loose with sufficient wrinkles to permit shrinkage up to 15%.

E. CUTTING DOWN TREES

The Contractor must consult the Architect before cutting down or pruning any trees or shrubs encountered on the Site.

Preambles
Excavations

CONCRETE WORK

A. ARCHITECT/ENGINEER

For the purposes of the concrete structure the Structural Engineer, hereafter referred to as "the Engineer", shall be deemed invested with the duties and be the representative of the Architect.

B. CODE OF PRACTICE

All workmanship, materials, tests and performances in connection with the reinforced concrete work are to be in conformity with the latest edition of the British Standard Code of Practice (C.P. 8110 for "The Structural Use of Concrete") where not inconsistent with these Preambles.

C. SUPERVISION

A competent person approved by the Engineer shall be employed by the Contractor whose duty it 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, in consultation with the Engineer.

D. 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, transporting, storing and proportioning ingredients, and for mixing, transporting and placing concrete, the Contractor shall submit drawings for approval by the Engineer, showing proposed general plant arrangements, 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 if it can be demonstrated to the satisfaction of the Engineer that equal results will be obtained by the use of such alternatives.

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 these Preambles governing the quality of the materials or of the finished work.

Where suspended floor slabs are to be constructed without expansion joints, concreting is to be in panels of size and positions to the approval of the Engineer. To permit setting shrinkages to occur, some panels will be left unconcreted until 7 days or more after main areas have been concreted. The Contractor must include for this method of construction in his pricing.

Preambles
Concrete Work

A. **TOLERANCES**

On all setting out dimensions of 5 metres and over a maximum non-accumulative tolerance of plus or minus 5 millimetres will be allowed. On all setting out dimensions under 5 metres a maximum non-accumulative tolerance of plus or minus 3 millimetres will be allowed. On the cross-sectional dimensions of structural members, unless otherwise required by the Drawings, a maximum tolerance of plus or minus 3 millimetres will be permitted.

The top surface of concrete floor slabs and beams shall be within 6 millimetres of the normal level and line shown on the Drawings. Columns shall be truly plumb and non-accumulative tolerance of 3 millimetres in each storey and not more than 15 millimetres out 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.

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

The sources of supply for all materials used for concrete work shall be approved by the Engineer before these materials are delivered on the Site. All materials shall comply with the requirements of the latest appropriate British Standard unless otherwise agreed with the Engineer, whose approval shall be obtained in writing.

The suppliers of materials shall give the Engineer access to their premises when directed for the purpose of obtaining samples of the materials for testing.

C. **SAMPLES**

Samples of materials shall be submitted 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.

Every facility shall be provided to enable the Engineer to obtain samples and carry out tests on the materials and construction. If these tests show that any of the materials or construction do not comply with the requirements of this Specification, the Contractor will be responsible for the costs of the tests and the replacement of defective materials and/or construction.

Samples of all materials proposed to be used shall be submitted to the Engineer and shall be tested, where required, by the Materials Branch of the Ministry of Works or other approved testing place, and receive his approval prior to being delivered in bulk upon the Works.

The Contractor's attention is drawn to the fact that the testing of samples of aggregate, sand and cement by the Materials Branch, M.O.W., takes time and it is of the utmost importance that the samples should be submitted for testing as soon as possible after the letting of the Contract. The Ministry will not accept any responsibility whatsoever for delay in the commencement of the Contract due to delay on the part of the Contractor in submitting samples.
Concrete Work

A. CEMENT

Cement, unless otherwise specified, shall be Portland cement of a brand approved by the Engineer and shall comply with the requirements of B.S. 12 with the exceptions that it may contain reactive volcanic ash (of not more than 10% of the total weight) and the quantity of insoluble residue permitted in B.S. 12 may be exceeded. A manufacturer's Certificate of Test in accordance with B.S. 12 shall be supplied for each consignment delivered to the Site.

Should the Contractor require to use cement of the rapid hardening variety, he shall obtain the approval of the Engineer and also obtain any instructions regarding modifications to these Preambles caused thereby. Any additional cost that may be caused by the use of rapid hardening cement shall be at the Contractor's expense.

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 weather-proof 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 more than 1,500 mm in height.

If delivered in bulk the cement shall be stored in a weather-proof 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.

B. AGGREGATES

The aggregates shall conform with the requirements of B.S. 882 and the sources and types 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 B.S. 882 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 aggregate 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. It shall be graded within the limits of Zone 1 or 2 of Table 2 of B.S. 882.

Coarse aggregate shall be good, hard, clean approved blacktrap or similar stone, free from dust, decomposed stone, clay, earthy matter, foreign substances or friable thin elongated or laminated pieces. It shall be graded within the limits of Table 1 of B.S. 882 for its respective nominal size.

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

Aggregates shall be delivered to the Site in their prescribed sizes or gradings and shall be stockpiled on paved areas or boarded platforms in separate units to avoid intermixing. On no account shall aggregates be stockpiled on the ground.

C. 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.
Concrete Work

A. READY-MIXED CONCRETE

Ready-mixed concrete may only be used with the prior permission of the Engineer, subject to special additional conditions laid down by the Engineer.

B. CONCRETE MIXES

Concrete mixes have been described either by the volumetric proportions or by the 28-day cube strength.

C. CONCRETE STRENGTHS

Concrete mixes shall have the following minimum strengths as given by Works Cube Tests:

Minimum Crushing Strength at 28 Days

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</table>

The average strength obtained from cube tests shall be 10% higher than the minimum strengths shown above.

Works Cube Tests will not be required for Grade E blinding concrete which shall comprise 1:4:8 by volume. Volumetric mixes shall comprise the following:

<table>
<thead>
<tr>
<th>Cement/Kg</th>
<th>Fine Aggregate/CM</th>
<th>Coarse Aggregate/CM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1:2</td>
<td>50</td>
<td>0.03</td>
</tr>
<tr>
<td>1:1.5:3</td>
<td>50</td>
<td>0.05</td>
</tr>
<tr>
<td>1:2:4</td>
<td>50</td>
<td>0.07</td>
</tr>
<tr>
<td>1:3:6</td>
<td>50</td>
<td>0.10</td>
</tr>
<tr>
<td>1:4:8</td>
<td>50</td>
<td>0.13</td>
</tr>
</tbody>
</table>

D. MEASURED PROPORTIONS OF CONCRETE

Cement

The quantity of cement shall be measured by weight. Where delivered in bags, each batch of concrete is to use one or more whole bags of cement.

Aggregates

Concrete aggregates shall be measured by weight in a weigh batching machine. Weigh batching machines shall be of an approved type and shall be properly maintained and checked for accuracy at regular intervals.

Preambles
Concrete Work

MEASUREMENT PROPORTIONS OF CONCRETE (Cont’d)

A. CONCRETE GRADES A, B, C & D

The weights of fine and coarse aggregate to be used in concrete Grades A to D shall be limited in accordance with the table below. The proportions of fine to coarse aggregate and cement which the Contractor proposes to use for each of the mixes specified shall first be approved by the Engineer. The Contractor will then be required to prepare Preliminary Test Cubes and have these cubes tested as described for Work Cube Tests. The test results should be submitted to the Engineer in sufficient time for further tests to be carried out should they prove unsatisfactory. Cube strengths in the preliminary tests must show crushing strengths at least 25% higher than the strengths specified for Works Cube Tests. If the Contractor is unable to produce specified cube strengths, he will be required at his own cost to increase the cement content of the mix until satisfactory results are produced.

The Engineer may require at any time during the Contract the proportions of fine to coarse aggregate to be altered in order to produce a mix of greater strength or improved workability and providing that the total proportions of aggregate to cement remain unchanged, no claim for additional cost will be considered.

B. MINIMUM CEMENT CONTENT

<table>
<thead>
<tr>
<th>Concrete Grade</th>
<th>Minimum Cement Content by weight to combined total weight of aggregate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade A</td>
<td>1 to 4.5</td>
</tr>
<tr>
<td>Grade B</td>
<td>1 to 5.5</td>
</tr>
<tr>
<td>Grade C</td>
<td>1 to 7</td>
</tr>
<tr>
<td>Grade D</td>
<td>1 to 7</td>
</tr>
</tbody>
</table>

C. WATERPROOF CONCRETE

Where waterproof concrete is specified, “Sealopruf Integral Water-proofing Compound” and “Sealoplaz Concrete Plasticiser” as manufactured by Sealocrete Group Sales Ltd., Atlantic Works, Hythe Road, London NW10 5RD, England, are to be added to the mixing water strictly in accordance with the manufacturer’s instructions and at the rate of 0.50 litres and 0.25 litres respectively to each 50 Kg. bag of cement to which the aggregates have already been added and mixed. Not more than 25 litres of water per 50 Kg. bag of cement are to be used unless otherwise approved by the Engineer.

D. EXPANSION JOINTING

Expansion joint filler shall be “Flexcell” as manufactured by Expandite Ltd., or “Resilex” as manufactured by Evomastics Ltd., or other equal and approved.

E. JOINT SEALER

Sealers shall be either hot or cold applied. Hot applied sealers shall comply with B.S. 2499. Cold mastics shall be applied by gun and where more than 12 mm deep shall include filling with loose packing yarn to within 2 mm from the outer face. All joint sealers are to be approved by the Engineer prior to their use.

Preambles
A. WATERBAR

Waterbar shall be PVC waterbar as manufactured by Expandite Ltd., or other approved type and shall be provided in the positions indicated on the Drawings.

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 waterbar 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 formers and blocking pieces to support the waterbar and to ensure that it is not displayed 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 of 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 the waterbar is positioned at the base of the lift shall have sufficient openings not less than 300 mm square at approximately 200 mm above the level of the waterbar to permit checking that the waterbar is correctly positioned and not displaced during concreting.

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.

B. TESTING EQUIPMENT

The Contractor shall provide the following equipment for carrying out control tests on the Site:

(a) Straight edges 3 metres and 1 metre long for testing the accuracy of the finished concrete;

(b) A glass graduated cylinder for use in the silt test for organic impurities in the sand;

(c) Slump test apparatus;

(d) Four 150 mm steel cube moulds with base plates and tamping rods to B.S. 1881.
Concrete Work

A. WORKS CUBE TESTS

Works cubes are to be made at intervals as required by the Engineer in accordance with C.P. 114, and the Contractor shall provide a continuous record of the concrete work. The cubes shall be made in approved 150 mm moulds in strict accordance with the Code of Practice.

Three cubes shall be made on each occasion.

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 made.
(c) Location in work.
(d) 7-day Test:
   Date
   Strength
(e) 28-day Test
   Date
   Strength

Cubes shall be forwarded, carriage paid, to an approved Testing Authority, in time to be tested two at 7 days and the remaining one at the discretion of the Engineer. No cube shall be despatched within 3 days of casting.

Copies of all Works Cube Tests shall be forwarded to the Engineer and Quantity Surveyor and one shall be retained on the Site.

If the strengths 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 Works Cube Tests.

B. MIXING AND PLACING OF CONCRETE

The concrete shall be mixed only in approved power-driven mixers of a type and capacity suitable for the work, and in any event not smaller than 0.40/0.28 cu.m. capacity.

The mixer shall be equipped with an accurate water measuring device. All materials shall be thoroughly mixed dry 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, 10% extra cement shall be added to the first batch and no extra payment will be made on this account.
Proposed Toilet Block for IUCN

Concrete Work

Mixing and Placing of Concrete (cont’d)

As a check on concrete consistency slump tests may be carried out and shall be in accordance with B.S. 1881. The Contractor shall provide the necessary apparatus and carry out such tests as are required. The slump of the concrete made with the specified water content, using dry materials, shall be determined and the water to be added under wet conditions shall be so reduced as to give approximately the same slump.

The concrete shall be mixed as near to 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 sections being 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 approved means which do not cause 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 prior approval of the Engineer.

Concrete shall be placed from a height not exceeding 1,500 mm 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 1,500 mm deep in walls and similar members.

Concrete in columns may be placed to a height of 4 metres with careful placing and vibration and satisfactory results. Where the height of the column exceeds 4 metres suitable openings must be left in the shutters so that this maximum lift is not exceeded.

Concrete shall be placed continuously until completion of the part of the work between construction joints as specified hereinafter or of a part of approved extent. At the completion of a specified or approved part a construction joint of the form and in the positions hereinafter specified shall be made. If stopping of concreting be 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.

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

The Contractor shall provide runways for concreting to the satisfaction of the Engineer. Under no circumstances will the runways be allowed to rest on the reinforcement.

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 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 Work

A. **COMPACTION**

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

Concrete shall not be placed at a rate greater than will permit satisfactory compaction nor to a depth greater than 400 mm before it is compacted.

During and immediately after placing, the concrete shall be thoroughly compacted by means of continuous tamping, spading, slicing and vibration. **Vibration is required for all concrete of Classes 40, 35, 25 and 20**

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 began 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 be a frequency of not less than 7,000 cycles per minute and shall have a rotating eccentric weight of at least 0.50Kg, with an eccentricity of not more than 12 mm. Such vibrators shall visibly affect the concrete within a radius of 250 mm 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 vibrating 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 for every 1.5 cubic metres of concrete placed per hour and at least one spare vibrator shall be maintained on Site in case of breakdown 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 1,200 mm centres.

In addition to internal and external vibration the upper surface of suspended floor slabs shall be levelled by tamping or vibrating to receive finishes. Vibrating elements shall be of the low frequency high amplitude type operating at a speed of not less than 3,000 r.p.m.

Preambles
Concrete Work

A. CONSTRUCTION JOINTS

Construction joints shall be permitted only at the positions pre-determined on the Drawings or as instructed on the Site by the Engineer. In general they shall be perpendicular to the lines of principal stress and shall be located at points of minimum shear, viz., vertically at, or near, mid-spans of slabs, ribs and beams.

Suspended concrete slabs are generally to be cast using alternate bay construction in bays not exceeding 20 metres in length. No two 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 already 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 least 25 mm in thickness composed of cement and fine aggregate in the proportions used in the concrete.

B. 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 hessian sacking, 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 will be required to provide complete coverage of all fresh concrete for a period of 7 days. Hessian or 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, hessian or other material in small pieces.

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

C. FAULTY CONCRETE

Any concrete which fails to comply with these Preambles, or which shows signs of setting before it is placed shall be taken out and removed from the Site. Where concrete is found 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. The whole of the cost whatsoever, which may be occasioned by the need to remove faulty concrete, shall be borne by the Contractor.
Concrete Work

A. **ROD REINFORCEMENT**

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

- Hot rolled bars for the reinforcement of concrete to B.S. 4449 (metric units)
- Cold worked steel for the reinforcement of concrete to B.S. 4461 (metric units)

The Contractor will be required to submit a test certificate of the rollings. Reinforcement shall be stored on racks above ground level. 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.

B. **FABRIC REINFORCEMENT**

To be electrically cross-welded steel wire mesh reinforcement to B.S.4483, 1969 and of the size and weight specified.

C. **FIBERMESH REINFORCEMENT**

Where fibermesh is specified it shall be Fibermesh "FIBERMIX 7025" and Fibermix "HARBOURITE 6927" as manufactured by Fibermesh Europe Ltd., Smeckley Wood Close, Sheepbridge Chesterfield, S41 9PZ England and shall comply with British Board of Agreement (BBA) Certificate No. 92/2857 and shall be added to the concrete mix in accordance with the manufacturer's instructions.

D. **FIXING ROD REINFORCEMENT**

Reinforcement shall be accurately bent to the shapes and dimensions shown on the Drawings and Schedules and in accordance with B.S. 4466 (1969). Reinforcement must be cut and bent cold and no welded joints will be permitted unless so detailed.

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 concreting shall be commenced until the Engineer has inspected the reinforcement in position and until his approval has been obtained and the Contractor shall give two clear days' notice of his intention to concrete.

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 to adjust and correct the position of any reinforcement which may be displaced. The vibrators are not to come into contact with the reinforcement.
Concrete Work

A. POSITION AND CORRECTNESS OF REINFORCEMENT

Irrespective of whether any inspection and/or approval of the fixing of the reinforcement has been carried out as above, it shall be the Contractor's sole responsibility to ensure that the reinforcement complies with the details on the Drawings or Schedules and is fixed exactly in the positions shown therein and in the positions to give the prescribed cover. The Contractor will be held entirely responsible for any failure or defect in any portion of the reinforced concrete structure and including any consequent delay, claims, third party claims, etc., where it is shown that the reinforcement has been incorrectly positioned or is incorrect in size or quantity with respect to the detailed Drawings or Schedules.

B. SPACER BLOCKS

Spacer blocks of approved size and shape made of concrete similar to that used in the surrounding construction and fixed 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. Where hollow concrete block construction is used, spacer blocks are to be provided as shown on the Drawings. These will consist of concrete blocks as described above made to fit the width of the rib less 3 mm tolerance and with single or double grooves (depending on the number of reinforcement bars used per rib) in the top surface with wire ties at each groove.

C. CONCRETE COVER TO REINFORCEMENT

Unless otherwise directed the concrete cover to rod reinforcement over main bars in any face shall be:

- Foundations against each face: 75 mm
- Foundations against blinding: 50 mm
- Columns: 40 mm
- Beams: 25 mm
- Slabs: 15 mm

D. FIXING FABRIC REINFORCEMENT

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

E. 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.

Preambles
Concrete Work

A. **FIXTURES**

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 position of all electrical conduits 25 mm and over in diameter shall be submitted to the Engineer for his approval before being placed.

B. **CHASES, HOLES, ETC. IN CONCRETE**

The Contractor shall be responsible for the co-ordination with the Electrical and other Sub-Contractors for incorporating electrical conduit, 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 concrete 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, chases, holes, etc., to be left in the concrete shall be accurately set out and cast with the concrete.

C. **POSITION OF ELECTRICAL CONDUIT**

Unless otherwise instructed by the Engineer all electrical conduit to be positioned within the reinforced concrete shall be *fixed inside* the steel cages of beams and columns and *between the top and bottom* steel layers in slabs and similar members.

The proposed position of all electrical conduits 25 mm and over in diameter which are to be enclosed in the concrete shall be shown accurately on a plan to be submitted to the Engineer, whose approval shall be obtained before any such conduit is placed.

D. **FORMWORK**

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

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

E. **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, braces, plates, etc., properly held together by bolts or other fastenings to prevent displacement, vibration or movement by the weight of materials, men and plant on same and so wedged and clamped as to permit of easing and removal of the formwork without jarring 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 shall be erected with an upward camber of 5 mm for each 5 metres of horizontal span or as directed by the Engineer.

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 caulked to the Engineer's approval before concreting.

Preambles
Concrete Work

Construction of Formwork (Cont’d)

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 any way 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 oiled 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.

Temporary openings shall be provided at the base of columns, wall and beam forms and at any other points where necessary to facilitate cleaning and inspection immediately before the pouring of concrete. Before the concrete is placed the shuttering shall be trued-up and any water accumulated therein shall be removed. All sawdust, chips, nails and other debris shall be washed out or otherwise removed from within the formwork. The reinforcement shall then be inspected for accuracy of fixing. Immediately before placing the concrete the formwork shall be well wetted and inspection openings shall be closed.

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, and made good to the requirements of the Engineer. Any voids or honeycombing shall be treated as described in "Faulty Concrete".

A. 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 and the minimum periods that shall elapse between the placing of the concrete and the striking of the formwork will be as follows:-

- Beam sides, wall and columns (unloaded) 2 days
- Slab soffits (props left under) 3 days
- Beam soffits (props left under) 7 days
- Removal of props (partly subject to 7 days concrete cube strength being satisfactory) to:-
  - Slabs 10 days
  - Beams 14 days
  - Cantilevered beams and slabs 28 days

GD/20
Concrete Work
If the Contractor wishes to take advantage of the shorter stripping times permitted for beam and slab soffits when props are left in place, he must so design his formwork that sufficient props as agreed with the Engineer can remain in their original positions without being moved in any way until expiry of the minimum time for removal of props. Stripping and re-propping will not be permitted.
The above times may be reduced in certain circumstances, at the discretion of the Engineer, provided an approved method is adopted at the Contractor’s expense to ensure that the required concrete strength is attained before the forms are stripped.

Solid strips in composite slabs shall be considered as beams. The tops of retaining walls shall be adequately supported with stout raking props at intervals required by the Engineer. These props are not to be removed until 7 days after casting of the floor slab over.

A SUPPORTING PROPS TO WALL AND BEAM SOFFITS
Where directed by the Engineer supporting props to wall and beam soffits are to be left in position until completion of the whole of the reinforced concrete structure.

The props are to be to the approval of the Engineer and the Contractor must submit the suggested method of propping to the Engineer prior to removal of formwork to the relevant surfaces.

EXPOSED CONCRETE FINISHES

B. GENERAL
Contractors will be required at an early stage in the Contract, to prepare samples for the approval of the Architect of the various concrete finishes specified hereafter. Samples are to be prepared using the same materials and the same methods of construction, compaction, curing, etc., as the Contractor proposes to use for executing the full quantity of the work.
A record of the mix, water content, method of compaction, any additives used, etc., is to be kept for each sample prepared. When the Architect has approved a sample it will be kept on Site in an approved location. The finishes in construction will be expected to be up to a standard equal to the approved sample. The Contractor is to include for all costs for preparing samples in his rates for the respective finish. Consistency in cement colour and colour, grading and quality of aggregates must be maintained in all finished concrete work.

C. TAMPERED FINISH
Areas so specified shall be finished at the time of casting with a tamped finish to the Architect’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.

D. CHAMFERS AND REBATES TO EXPOSED CONCRETE
Wherever concrete surfaces are to remain exposed and otherwise where specified or shown on the Drawings, rebates and chamfers are to be provided at junctions, corners, and changes in direction of concrete members.

Rebates will also be required to surrounds to chisel-dressed, brushed, or similar concrete finishes. Rebates and chamfers are to have a fair face finish. Unless otherwise instructed concrete pours to columns and to other members where applicable are to terminate only at the pre-determined rebate positions.
Concrete Work

A. FAIR FACE

Fair face surfaces shall be clean, smooth, even, true to form, line and level, and free from all board marks, joint marks, honeycombing, pitting, and other blemishes. Forms are to be provided with a smooth lining of plywood, steel, or other approved material which will achieve the required finish without any general rubbing down. Rubbing down will only be permitted to remove any projecting fins at corners or joints.

B. FINE FACE

Fine face surfaces shall be as above but to a higher standard obtained from forms provided with an impervious sheet lining of metal or plastics faced plywood in large panels arranged in an approved pattern.

Rubbing down shall only be permitted after inspection by the Engineer. The finished surface shall be capable of receiving a painted finish.

C. BRUSHED CONCRETE FINISH

Brushed concrete finish shall be provided to precast concrete members where specified or shown on the Drawings.

The surface is to be sprayed with water and brushed within 2 hours of casting to expose the aggregate to an extent to be approved by the Architect.

The brushed face will generally be contained within a surround of fair face concrete and the Contractor is to allow for retaining the fair face forms or otherwise protecting the surround whilst achieving the brushed finish.

D. BOARD-MARKED FINISH

The required finish is to be a board-marked pattern and the boards are to be arranged vertically or horizontally to the patterns shown on the Drawings or as otherwise agreed by the Architect.

Formwork shall be made from timber of sufficiently strong grain to the Architect's approval in matching widths with straight sawn staggered joints. Short make-up lengths will not be permitted and boards shall generally be in the longest lengths practical. Construction joints shall be at predetermined positions and at recesses where so detailed.

E. CHISEL-DRESSED FINISH

Chisel-dressed finish is to be carried out on any grade of concrete but not until it is at least 30 days old.

The surfaces are to be fully chisel-dressed to remove a maximum of 12 mm (average 9 mm) of the surface by shearing and exposing the aggregate without excessive cracking of the surrounding matrix.

Arrises of columns, beams, etc., are pre-formed fair face with timber fillets (which have been measured separately) set in the formwork and care must be taken in working up to these 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.
Concrete Work

Chisel-dressed Finish (Continued)

All surfaces requiring this treatment are to have the margins chisel-dressed by hand for a minimum width of 75 mm commencing from the fillet edge. Thereafter mechanical chisel-dressing may be used but the Contractor must ensure that a uniform texture and even plane surface is achieved.

The use of sharply pointed steel tools for both hand and mechanical chisel-dressing is essential. Upon completion the surfaces are to be thoroughly wire brushed and washed down.

A. PROTECTION OF FINISHES

Wherever possible, in-situ exposed concrete finishes should be commenced at the highest level and worked progressively down the building.

Precaution shall be taken to avoid staining or discolouration of previously finished concrete faces by leakage of grout from newly placed concrete. The Contractor shall during all stages of construction adequately protect all concrete finishes from damage by leaking grout, knocking, paint stains, falling plaster, etc. In cases of balustrade walls to staircases and members where damage is otherwise likely, concrete finishes shall be protected by cladding with timber, celotex, or other approved sheeting. All Sub-Contractors shall be informed accordingly on the precautions to be taken.

B. PRECAST CONCRETE

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

The compaction 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 consolidated 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 material 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 handling 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" the moulds shall be made of suitably strong sawn timber true in form to the shapes required. Unless otherwise described faces are to be left rough from the sawn moulds.

Preambles
Concrete Work

Precast Concrete (continued)

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 fairface to the finished concrete suitable to receive a painted finish direct and free from all shutter marks, holes, pittances, etc.

The precast units shall be installed to the lines, gradients and dimensions shown on the Drawings or as directed by the Engineer.

A. CONCRETE SURFACE BEDS

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 concrete shall be spread to such a thickness that when compacted it shall have the finished thickness as specified or shown on the Drawings. A layer of concrete 50 mm less than the finished thickness shall first be spread and struck off at the correct level to receive the top fabric 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 compacting and finishing of the concrete shall be effected by immersion vibrators and a hand or mechanical tamper weighing not less than 10 Kg. per linear metre and having a tamping edge shod with a steel strip 75 mm wide fixed to the tamper by countersunk screws. Immersion vibrators with "spade" attachments will be permitted. Compaction shall be continued until a dense, scaled surface finish is achieved. Over-compaction causing an excessive amount of fines to be brought to the surface shall be avoided.

The surface of the concrete shall be finished with a wood float finish to the levels, falls and crossfalls, as directed or shown on the Drawings and shall be subject to the following tolerances:-

1. The level shall be within + or - 6 mm of the levels directed.
2. The falls shall be within 10% of the falls directed.
3. The smoothness shall be such that departures from a 3 metre straight edge laid in any direction shall not exceed 3 mm.

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. Before the concrete has finally set and after completion of the floating the concrete shall be brushed with a strong-headed broom to produce a grooved finish in parallel lines to the satisfaction of the Engineer.

As soon as the surface has been finished it shall be protected against too-rapid drying by means of damp hessian, 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 24 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.

Preambles
Concrete Work

A. HOLLOW CLAY POTS

The hollow clay pots for suspended floor shall be manufactured by Messrs. Clayworks Ltd., P.O. Box 48202, Nairobi and shall be suspended floor units size 350 mm x 300 mm x 230 mm deep. Care shall be taken in unloading, stacking and placing hollow pots in position. Damaged units shall not be incorporated in the works and shall be removed from site.

B. HOLLOW BLOCK SUSPENDED FLOORS

The hollow blocks shall be set out to the dimensions shown on the drawings. Slip tiles will not be required. Care shall be taken when placing and vibrating the concrete to avoid damage to or displacement of the pots.

C. NOTES CONCERNING PRICING

The Contractor must allow for all costs incurred during the progress of the Contract for complying with the provisions concerning the preparation and use of graded mixes.

Prices for plain or reinforced concrete shall include for mixing, hoisting, depositing, compacting, curing and protection at the various levels required throughout the building, and shall also include for forming or hacking a satisfactory key for all faces receiving asphalt and plaster work. Prices for slabs shall include for forming construction joints at bay edges, including all necessary temporary formwork and supplying records of such joints to the Engineer.

Prices for steel rod reinforcement shall include for cutting to lengths and all labour in bending and cranking, forming hooked ends, handling, hoisting and fixing in position and for providing all necessary tying wire, spacer blocks and supports. Prices for fabric reinforcement shall include for all straight cutting and waste, handling, hoisting and fixing in position, providing all necessary tying wire, and supports and all extra material in laps.

The prices for formwork shall include for extra material at joints, extra labour and waste for narrow widths, small quantities, overlaps, passings at angles, straight cutting and waste, splayed edges, notchings, etc., and for fixing at the various levels including battens, struts, and supports and for bolting, wedging, easing, striking and removal. Prices for linear items such as boxings shall include for angles and ends.

Prices of all precast concrete shall include for all moulds, finishing as described, handling, reinforcement, hoisting and fixing at the required levels and for casting or cutting to the exact lengths required and any waste resulting from such cutting.

Prices for expansion joints shall include for cutting to size and all temporary supports and prices for expansion joint sealers shall include for all temporary battens or fillets required to form the necessary grooves.

Prices for hollow concrete block suspended construction must be "all inclusive" to include for concrete hollow tiles, in-situ concrete ribs, concrete topping, concrete filling to open ends of hollow concrete tiles and solid concrete bearings and beams.

The Contractor is to allow in his prices for carrying out all tests as specified in this Section apart from work cube tests for which a provisional item is included in the Preliminaries section of these Bills of Quantities. The price for wrought formwork shall include for fair face finish either by rubbing down or by smooth lining, all as described in these Preambles.
Proposed Toilet Block for IUCN

Concrete Works

WALLING

A. STONE
Stone for walling shall be hard, dense, stone from an approved quarry with accurately dressed faces on all sides.

Stone walling described as load-bearing shall have a minimum crushing strength of 14.00 Newtons per square millimetre and shall comply with C.P. 111: Part 2.

B. CONCRETE BLOCKS
All hollow or solid concrete blocks for general use shall comply with B.S. 2028, Type 'A' and with C.P. 111: Part 2, of minimum crushing strength of 3.5 Newtons per square millimetre, and must be obtained from and approved manufacturer, equal to samples deposited with and approved by the Architect.

Concrete block walling described as load-bearing shall have a minimum crushing strength of 7.0 Newtons per square millimetre.

All concrete blocks must be cured for a minimum period of four weeks before use and all testing of blocks is to be carried out by the Ministry of Works Materials Testing Laboratory.

C. WALL REINFORCEMENT
All walling of thickness 150 mm and less shall be reinforced with hoop iron 25 mm wide or similar reinforcement centrally in every alternate joint (vertically for the full length of the walls, lapped and crimped 300 mm at running joints and full width of wall at angles and intersections).

D. WALL TIES
20 Gauge hoop iron ties 25 mm wide x 450 mm long to be provided for every alternate course at all connections between block walls and reinforced concrete columns or walls. One end to be cast into concrete and other end bent and built into mortar joint of walling.

E. CHASING
Chasing in load-bearing walling of electrical conduit, pipes, etc., is to be kept to a minimum size of cut and positions and runs of chases are to be approved by the Architect before any cutting is commenced. Horizontal runs will not be permitted.

F. CEMENT
The cement shall be as described in "Concrete Work".

G. SAND
The sand for mortars shall be as described in "Concrete Work", except that it shall be fine sand.

Preambles
Walling

A. **LIME**

The lime for plastering shall comply with B.S. 890, Class 'A' for non-hydraulic lime and shall be as rich as obtainable and to approval. It must be freshly burnt and shall be slaked at least one month before being used by drenching with water, well broken up and mixed and the wet mixture shall be passed through a sieve of sixty-four meshes to the square inch. Lime putty shall consist of freshly slaked lime as above described, saturated with water until semi-fluid and passed through a fine sieve; it shall then be allowed to stand until superfluous water has evaporated and it has become of the consistency of thick paste, in no case for a shorter period than one month before being used, during which it must be kept damp and clean and no portion of it allowed to become dry.

Alternatively, hydrated lime with 70% average calcium oxide content may be used and it must be protected from damp until required for use. It shall be soaked to putty at least 24 hours before use.

B. **MORTARS**

Cement mortar shall consist of one part of Portland cement, to three parts of sand by volume.

The cement/lime mortar shall consist of one part of Portland cement, one part of lime and six parts of sand by volume.

The ingredients of mortar shall be measured in proper gauge boxes on a boarded platform, the ingredients being thoroughly mixed dry, and again whilst adding water. In the case of cement/lime mortar the sand and lime shall be mixed first and then the cement added.

All mortar is to be thoroughly mixed to a uniform consistency with only sufficient water to obtain a plastic condition suitable for trowelling. No mortar that has commenced to set is to be used or remixed for use.

C. **SETTING OUT**

The Contractor shall provide proper setting out rods and set out on the same all work showing openings, heights, sills and lintels and shall build the various walls and piers to the thicknesses, widths and heights shown upon the Drawings. No part of the walling shall be carried up more than one metre higher at one time than any other part and in such cases the jointing shall be made in long steps so as to prevent cracks arising and all walls shall be levelled round at floor and wall heads.

D. **BONDING WALLING**

All blocks shall be properly bonded together and in such a manner that no vertical joint in any one course shall be within 100 mm of a similar joint in the courses immediately above and below. Alternative courses of walling at all angles and intersections shall be carried through the full thickness of the adjoining walls.

All perpends, reveals, quoins and other angles and joints of the walls, etc., shall be built strictly true and square.
Walling

A. LAYING AND JOINTING

All bricks and blocks are to be well wetted before laying and tops of walls where left off shall be well wetted before commencing building. All joints are to be 10 mm thick and flush up and grouted in solid as the work proceeds.

All exposed faces of walls for plastering are to be left rough and the joints raked out while mortar is green to form adequate key.

All other faces shall be cleaned down on completion with a wire brush or as necessary and mortar droppings, smear marks, etc., removed and rates must include for this.

B. PUTLOG HOLES

All putlog holes shall be carefully, properly and completely filled up on completion of walling and before plastering is commenced.

C. FAIR FACE

Walling described as fair-faced shall be built with selected blocks and pointed with neat flush joints. Stone walling shall be fine chisel dressed.

D. BRICKS

All bricks shall be obtained from Clayworks Limited, P.O. Box 45154, Nairobi, of sizes as required and shall be hard, sound, square, well-burnt, uniform in shape and free from cracks, stones and other defects.

Samples of bricks shall be deposited with and be approved by the Architect before being used and all subsequent bricks used in the Works shall be equal to the approved sample.

E. DAMP-PROOF COURSES

Damp-proof courses shall be bituminous felt to B.S. 743 weighing 7 lbs. per square yard, free from tears and holes, and be laid with 150 mm minimum laps on and including a levelling screed of cement mortar.

F. PRICES TO INCLUDE

The rates for walling shall include for all reinforcement, all straight cutting, bonding, plumbing angles, forming reveals, pinning up to underside of concrete soffits and cutting up to sides of columns and building in ends of lintels and sills.

Preambles

GD/28
Walling

A. **BRICK WORK**

Brick work shall be built to a gauge of 4 courses to 340 mm of wall height including 10 mm bed joints.

Facing walls shall be built in stretcher bond and be tied to the blockworks or concrete backing walls with 10 gauge galvanised wire wall ties 500 mm girth, formed to a figure 8 and twisted together at the lap.

Three wall ties per square metre are to be used, wall ties for concrete backing walls shall be cast into the concrete including all temporary fixing to formwork.

Facing walls shall be pointed as the work proceeds. External walls shall have recessed joints and internal walls shall have flush joints. Facing walls shall be kept perfectly clean and no rubbing down of blockwork will be allowed.

B. **FAIR FACE**

Walling described as fair faced shall be built with selected bricks and pointed with neat recessed joints.
Walling

ROOFING

A. **PREPARATION OF SURFACES**

All surfaces to receive roofing shall be clean, dry, free from fins or projections and loose materials, and with cracks or voids filled with cement mortar.

B. **LIGHTWEIGHT ROOF SCREEDS**

Roof screeds will be executed to the approval of the Specialist Roofing Sub-Contractor and will consist of cement, sand and pumice (1:3:7) finished with 6 mm layer of cement and sand (1:4) topping. Screeds shall not be laid in areas exceeding ten square metres during any period of 24 hours. As bays are formed batten strips must be used to retain the exposed edge of the screed. Screeds shall be finished to falls and currents to receive roofing.

C. **ASPHALT ROOFING**

Asphalt roofing will be executed by an approved Specialist Roofing Sub-Contractor. Before any application of roofing, the Contractor is to ensure that all roof surfaces are thoroughly cleaned by sweeping.

Roofing asphalt to be B.S. 988/1966 Table 3, Column III, Tropical Mastic asphalt laid in two coats to a total thickness of 20 mm on and including black sheathing felt and finished with two coats aluminium paint to horizontal and vertical surfaces.

D. **GALVANISED CORRUGATED STEEL SHEETING**

The roof sheeting shall be of the gauge specified and comply with B.S. 3083. The roof sheeting shall be laid and fixed with steel hook bolts and nuts, steel roofing bolts and clips or steel roofing screws to B.S. 1494: Part 1.

E. **GALVANISED LT5 LONG TROUGH STEEL SHEETS**

Where specified the roof sheeting and fittings shall be 24 gauge LT5 galvanised steel long trough roofing as manufactured by MABATI ROLLING MILLS LTD. P.O. Box 46934, NAIROBI or other equal and approved manufacturer. The roof sheeting shall be laid and fixed with approved purpose made hook bolts, washers, etc. to ‘z’ purlins. Where so specified the roofing shall be prepainted with a RESINCOT FINISH.

F. **GALVANISED IT4 LONG TROUGH STEEL SHEETS**

Where specified, the roof sheeting and fittings shall be 24 gauge IT4 roofing as manufactured by GALSHEET KENYA LTD. P.O. Box 78162, NAIROBI or other equal and approved manufacturer. The roof sheeting shall be laid and fixed with approved purpose made hook bolts, washers, etc. to ‘z’ purlins. The ridge flashing sheets shall be IT4 profiled sheeting curved to the radii shown on the drawings. Where so specified the roofing shall be prepainted with a RESINCOT FINISH.
Roofing

A. CONCRETE TILE ROOFING

Concrete single lap tiles and fittings shall be to B.S.473 & 550 Part 2, Group B of the colour, finish, type, size and manufacturer approved by the Architect. A full range of fittings must be available to match the tiles. Tiles shall be 380 x 230 mm nominal unless otherwise specified. Tiles and fittings must be true to shape and of uniform structure. Surface coatings shall be firmly bonded.

Fixing shall include nailing to battens at every third course, at eaves, verges, and at the top course under the ridge.

Ridges and hips shall be bedded in cement mortar and roofs shall be left watertight.

B. CLAY TILE ROOFING

Clay tiles shall be "best" or selected quality as manufactured by the Kenya Clay Products Ltd.

Tiles shall be well wetted before use and all dropped or broken tiles shall be rejected before carrying.

Cutting of tiles, where necessary at hips or valleys, shall be carefully and neatly carried out with properly sharpened tools.

Tiling shall be executed to the Architect's satisfaction and roofs left watertight.

C. PROTECTION

All roof surfaces shall be kept clean and protected and handed over watertight at completion.
Roofing

CARPENTRY, JOINERY AND IRONMONGERY

A. ALL TIMBER

All timber shall be in accordance with the latest approved Grading Rules issued by the Government of Kenya (Legal Notice No. 358). Timber for Carpentry shall be SECOND (OR SELECT) GRADE and timber for Joinery shall be FIRST (OR PRIME) GRADE.

B. GENERALLY

All timber as it arrives on the Site shall be inspected by the Contractor, and any timber brought on the Site and not complying with the Specification or not approved, must be removed forthwith from the Site and only timber as approved shall be used in the Works.

The Contractor shall upon signing the Contract purchase sufficient supplies of specified hardwoods to avoid possible shortages at a later date.

C. SPECIES OF TIMBER

The following timber shall be used.

<table>
<thead>
<tr>
<th>Standard Common Name</th>
<th>Botanical Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cypress</td>
<td>Cypress spp.</td>
</tr>
<tr>
<td>Podocarpus</td>
<td>Podocarpus spp.</td>
</tr>
<tr>
<td>Cedar</td>
<td>Juniperus procera</td>
</tr>
<tr>
<td>E.A. Camphor wood</td>
<td>Ocotea usambarensis</td>
</tr>
<tr>
<td>African Mahogany (Munyama)</td>
<td>Khaya anthotheca</td>
</tr>
<tr>
<td>Mninga</td>
<td>Pterocarpus Angolensis</td>
</tr>
<tr>
<td>Mvule</td>
<td>Clorophora excelsa</td>
</tr>
<tr>
<td>Elgon Olive</td>
<td>Olea welwitschii</td>
</tr>
<tr>
<td>Pine</td>
<td>Pinus spp. (radiata &amp; patula)</td>
</tr>
</tbody>
</table>

D. TOLERANCES IN THICKNESS

Shall conform with the following extracts of Government of Kenya Grading Rules:

(1) Hardwood Grading: (First and Second Grades)

The following tolerances in thickness will be admitted:

(a) 15 mm oversize on pieces up to 25 mm in thickness.

(b) 3 mm oversize on pieces over 25 mm and up to 50 mm in thickness.

(c) 6 mm oversize on pieces over 50 mm in thickness.

Undersize will not be permitted.

Preambles
Carpentry, Joinery
and Ironmongery

**Tolerances in Thickness (Continued)**

(2) Softwood Grading: Strength Grades (for Carpentry)

First and Second Grades.

Undersize not allowed.

Oversize: All timber to be sawn oversize by 1.5 mm for 25 mm thickness and width. Not more than 3 mm in thickness and not more than 6 mm in width.

(3) Softwood Grading: Appearance Grades (for Joinery)

First and Second Grades.

All as for Strength Grades above.

A. **INSECT DAMAGE**

All timber 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 timber attacked or suspected of being attacked, notwithstanding that the timber concerned may have already been inspected and passed as fit for use.

B. **SEASONING OF TIMBER**

All timber shall be seasoned to a moisture content of not more than 22% for Carpentry and 15% for Joinery.

C. **PRESSURE IMPREGNATION PRESERVATIVE TREATMENT**

All carpentry timbers, sawn joinery and timber grounds for fixing joinery shall be treated with pressure impregnated "Celcure" or "Tanalith" solution with a minimum nett retention of 0.35 lbs. of dry salt per cubic foot. If so required "charge sheets" issued after treatment with "Celcure" or "Tanalith" shall be submitted by the Contractor to the Architect for his retention. All cut ends and any other cut faces of timbers sawn after treatment shall be treated before fixing with "Celcure B" or "Wolmanol" solution brushed on.

The Contractor's prices for such timber hereinafter must allow for the above treatment.

D. **INSPECTION AND TESTING**

The Architect shall be given facilities for inspection of all works in progress whether in workshop or on site. The Contractor is to allow for testing of prototypes of special construction units and the Architect shall be at liberty to select any samples he may require for the purpose of testing, i.e. for moisture content, or identification, species, strength, etc.; such tests will be carried out by the Forestry Department.

Preambles
Carpentry, Joinery
and Ironmongery

A. CLEARING UP

The Contractor is to clear out and destroy or remove all cut ends, shavings and other wood waste from all parts of the buildings and the Site generally, as the work progresses and at the conclusion of the work.

This is to prevent accidental borer infestation and to discourage termites and decay.

B. WORKMANSHIP

All Carpenter's work shall be accurately set out in strict accordance with the Drawings and shall be framed together and securely fixed in the best possible manner with properly made joints; all brads, nails and screws, etc., shall be provided as necessary, directed and approved, and the Contractor's prices shall allow for all the foregoing.

All workmanship shall be of the best quality.

All Carpenter's work shall be left with sawn surfaces except where particularly specified to be wrought.

C. DIMENSIONS

Dimensions of timber for Carpentry left with sawn faces shall comply with the previous Clause specifying tolerances in thickness. Dimensions for wrought members shall be as described in "Joinery".

D. JOINTING

All timber shall be as long as possible and practicable to eliminate joints. Where joints are unavoidable surfaces shall be in contact over the whole area of the joint before fastenings are applied.

No nails, screws, or bolts are to be fixed in any split end. If splitting is likely, or is encountered in the course of any work, holes for nails are to be prebored at diameter not exceeding 4/5th 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. When the use of bolts is specified the holes are to be bored from both sides of the timber and are to be of the 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.

JOINERY

E. GENERALLY

All Joiner's work shall be accurately set out on boards to full size for the information and guidance of the artisans before commencing the respective works, with all joints, iron work and other works connected therewith fully delineated. Such setting out must be submitted to the Architect and approved before such respective works are commenced.
Carpentry, Joinery
and Ironmongery

JOINERY GENERALLY (Cont'd)

All Joiner's work shall be cut out and framed together as soon after the commencement of the building as is practicable, but not to be wedged up or glued until the building is ready for fixing same. Any portions that warp, wind or develop shakes or other defects within six months after completion of the Works shall be removed and new fixed in their place together with all other work which may be affected thereby, all at the Contractor's own expense.

All work shall be properly mortised, tenoned, housed, shouldered, dove-tailed, notched, pinned, bradded, etc., as directed and to the satisfaction of the Architect and all properly glued up with the best quality glue. All horns to be cut off neat and square with back of jambs before incorporating into the walls. The feet of all door jambs are to be cut off square with the floor finish and are to be dowelled to the structure with steel dowels.

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, sprigs, etc., are to be punched and puttied. 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. Glue 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 may be guaranteed casein or organic glues may be used.

All exposed surfaces of joinery work shall be wrought and all arrises "eased off" by planing and sandpapering to an approved finish suitable to the specified treatment.

A. DIMENSIONS

All joinery has been described by nominal sizes and a 3 mm reduction off specified sizes will be allowed for each wrought face except where described as finished sizes in which case joinery shall hold up full dimensions.

B. FIXING JOINERY

All beads, fillets and small members shall be fixed with round or oval brads or nails well punched in and stopped. All larger members shall be fixed with screws. Brass screws shall be used for fixing of all hardwoods, the heads let in and pelleted over with wood pellets to match the grain.

C. BEDDING FRAMES, ETC.

The Contractor's rates must include for bedding frames, sills, etc., in mortar or dressing surfaces of walls, etc., in lieu.

D. PLUGGING CONCRETE AND WALLS

Round wood plugs shall not be used. All work described as plugged shall be fixed with screws to plugs formed by drilling concrete, walls, etc., with a proper tool of suitable size at 750 mm spacing and filling the holes completely with "Philplug" rawl plastic or "Rawplugs" in accordance with the manufacturer's instructions. Alternatively, and where so agreed by the Architect, hardwood dovetailed fixing clips, dipped in "Wolmanol" or "Celcure B" solution cut and pinned or bedded in cement mortar (1:3) may be used.

Preambles
Proposed Toilet Block for IUCN

Carpentry, Joinery
and Ironmongery

A. FIBREBOARD

Fibreboard shall be 12 mm "Celotex", or other equal and approved termite-proofed softboard, cut to panels with V-edges.

B. PLYWOOD

Plywood shall be manufactured to comply with B.S. 1455 (Grades 1 or 2, Type INT for "interior work"; type WBP for "exterior work"). Marine plywood shall comply with B.S. 1088.

C. BLOCKBOARD

Blockboard shall be laminated board to approval, and exposed edges shall be lipped with 20 mm hardwood.

D. CHIPBOARD

Chipboard shall be manufactured to comply with B.S. 5669.

E. PLASTIC SHEETING

Plastic sheeting shall be "Formica" sheeting 1.5 mm thick and securely fixed with approved type waterproof adhesive, and in the colours approved by the Architect.

F. SELECTED FOR CLEAR FINISH

All timber and joinery work described as selected for clear finish shall be executed by a specialised joinery firm. The name of the firm shall be submitted to the Architect before any works commence.

G. PROTECT JOINERY

Any fixed joinery which in the opinion of the Architect is liable to become bruised or damaged in any way, shall be completely cased and protected by the Contractor until the completion of the Works. The casing shall consist of two layers of polythene sheeting or plywood coverings.

H. FLUSH DOORS

Semi-solid flush doors shall be manufactured to the thicknesses specified and consist of 100 mm wide framing all round with minimum 25 mm thick horizontal core battens at not more than 75 mm centres, pressure-impregnated as described and bored with 15 mm diameter ventilation holes at 300 mm centres. Doors shall have two lock blocks and be faced both sides with 6 mm plywood and have 25 mm mahogany twice rebated lipping all round and otherwise be equal to the requirements of B.S. 459 Part 2A, and equal to an approved sample.

I. BOTTOM EDGES

Bottom edges of doors shall be painted with one coat of approved primer before fixing.

Preambles
Proposed Toilet Block for IUCN

Carpentry, Joinery
and Ironmongery

A. IRONMONGERY

All locks and ironmongery shall be fixed with screws, etc., to match. Before the woodwork is painted, handles shall be removed, carefully stored and refixed after completion of painting and locks oiled and left in perfect working order. All keys shall be labelled with the door reference marked on labels before handing to the Architect on completion.

B. PRICES TO INCLUDE

Prices of items hereafter shall include for the foregoing labours, etc., and in addition the prices for linear items are to include all internal and external angles, either mitred or tongued, all fair, fitted, stopped, notched or returned ends, all similar incidental labours and all short lengths.
Carpentry, Joinery
and Ironmongery

METALWORK

A.  ALL MATERIALS

All materials shall be of the best quality, free from defects. The materials in all stages of transportation,
handling and piling shall be kept clean and damage from breaking, bending and distortion prevented.

B.  STRUCTURAL STEELWORK

Materials and workmanship shall conform with the requirements of B.S. 449. Steel frames, trusses and
purlins shall be carried out by a Nominated Sub-Contractor.

C.  NAILS, SCREWS AND BOLTS

Nails, screws and bolts shall be of best quality mild steel of lengths and weights approved by the Architect.
Nails shall be to B.S. 1202 and bolts to B.S. 916.

Bolts shall project at least two threads through nuts and all bolts passing through timber shall have washers
under heads and nuts.

D.  WORKMANSHIP

All work shall be carried out in the most workmanlike manner and strictly as directed by the Architect.

Welding shall be neatly cleaned off and units shall be prefabricated in the workshop wherever possible, the
minimum of site welding being employed.
All screwed work shall have full internal and external threads and holes shall have been cleaned off.
Countersinkings must be concentric.

E.  RAINWATER GOODS

Prices shall include for building in, casting in or cutting mortices for fastenings, all making good, jointing,
short lengths and all extra joints in the case of fittings.

F. METAL WINDOWS AND DOORS

Metal windows and doors shall be manufactured to B.S. 990 from hot rolled mild steel sections produced by
reputable mills and to be of dimensions and weights laid down in B.S. 990. Where specified all casements
and doors are to be made from heavy sections. Corners of frames are to be mitred and welded, and glazing
bars, etc., either tenon riveted or welded into frames. Top-hung casements are to be hung on steel hinges
and fitted with bronze peg stays. Side-hung casements are to be hung on projecting hinges and fitted with
bronze single point handle and cabin hook with concealed sliding stays.

G.  FIXING METAL WINDOWS, DOORS, ETC.

The Contractor's prices for fixing metal windows, doors, etc., shall include for assembling and fixing,
including screwing to wood frames or cutting mortices for lugs in concrete or walling and running with
cement mortar (1:4), bedding frames in similar mortar and pointing in mastic, bedding sills, transoms and
mullions in mastic, making good plaster around both sides, and fixing, oiling and adjusting all fittings and
frames.

Preambles
Metalwork

A. QUALITY OF MATERIALS AND WORKMANSHIP

The quality and workmanship of materials used in this Contract shall conform to the requirements of the following British Standards:

- B.S. 15 Mild steel for general structural purposes.
- B.S. 449 The use of structural steel in building.
- B.S. 4 p.2 Hot Rolled Hollow Sections.
- B.S. 994 Cold Rolled Steel Sections.
- B.S. 938 General requirements for the metal Arc welding of structural steel tubes to B.S. 1775.
- 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.

Materials may be required at any time to be tested in accordance with the British Standards listed above.

The cost of successful tests will be borne by the Client, but the Sub-Contractor shall supply at his own expense test specimens when required. The cost of tests which do not comply with the Standard will be borne by the Sub-Contractor.

B. STRUCTURAL HOLLOW SECTIONS

All hollow sections are to be connected by electric welding.

For butt welds the fusion surface of each member must be properly aligned and prepared.

C. ELECTRIC 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 for welding shall be prepared by planing or machine flame cutting.

During welding all 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.
Metalwork

ELECTRIC WELDING (Cont’d)

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 fillet weld shall be 6 mm.

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 farcut metals.

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

External faces of butt welds to be ground smooth.

A. 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 priming paint shall be made good to the Architect's satisfaction.
Metalwork

PLASTERWORK AND OTHER FINISHINGS

MATERIALS

A. CEMENT

The cement shall be as previously described in "Concrete Work".

B. SAND

The sand shall be as described for fine aggregate but that for plastering shall be light in colour and well graded to a suitable fineness in accordance with the nature of the work in order to obtain the finish directed.

C. LIME

The lime for plastering shall comply with B.S. 890 Class "A" for non-hydraulic lime and shall be as rich as obtainable and to approval. It must be freshly burnt and shall be slaked at least one month before being used by drenching with water, well broken up and mixed and the wet mixture shall be passed through a sieve of sixty-four meshes to the square inch. Lime putty shall consist of freshly slaked lime as above described, saturated with water until semi-fluid and passed through a fine sieve; it shall then be allowed to stand until superfluous water has evaporated and it has become of the consistency of thick paste, in no case for a shorter period than one month before being used, during which it must be kept damp and clean and no portion of it allowed to become dry.

Alternatively, hydrated lime with 70% average calcium oxide content may be used and it must be protected from damp until required for use. It shall be soaked to a putty at least 24 hours before use.

D. LIME PLASTER

Lime plaster shall consist of a backing coat in cement, lime and sand (1:2:9) and a finishing coat of lime putty skim with 10% cement added.

E. POLISHED GRANOLITHIC

Polished granolithic shall consist of one part cement (by volume) coloured light brown with an approved dye, to two parts (by volume) of metamorphic coral chippings graded from 6 mm down to 3 mm with not more than 15% to pass a No. 40 B.S. Sieve.

F. POLISHED TERRAZZO

All terrazzo work shall be carried out by an approved Sub-Contractor. Polished terrazzo shall consist of a first coat of cement and sand (1:3) and a 12 mm finishing coat of "Snowcrete" and marble chippings (1:2), coloured with "Cementone No. 1" colouring compound mix in the proportions of 1:10, compound to cement. The overall thickness will be as specified in the measured work.

Where terrazzo paving is specified as incorporating especially selected large aggregate the thickness of the finishing coat shall be increased as required.

G. VINYL ASBESTOS TILES

The vinyl asbestos floor tiles shall be 300 x 300 x 2 mm thick and shall comply with B.S. 3260. They shall be of selected pattern and colour from the "Marley Heavy Duty Tile Range" or equal and approved.

Preambles
Proposed Toilet Block for IUCN

A. **GLAZED WALL TILES**

White glazed wall tiles shall be size 150 x 150 x 6 mm thick, manufactured to comply with B.S. 1281.

B. **QUARRY TILES**

Quarry tiles shall be manufactured to B.S. 1286 type A and shall be chosen from the manufacturer’s standard colour range.

C. **PRECAST TERRAZZO TILES**

Precast terrazzo tiles are to be as manufactured by the Linotic Flooring Company Ltd., P.O. Box 42290, Nairobi, or equal and approved.

D. **ASBESTOS CEMENT PROMENADE TILES**

Shall be as manufactured by Eternit Building Products Ltd.

E. **MARBLE GLOMERATE TILES**

Marble glomerate tiles shall be as manufactured by the Linotic Flooring Company Ltd. All edges shall be square and faces polished, or equal and approved.

F. **BEDS AND BACKINGS**

Beds and backings shall be composed of cement and sand in the volumetric proportions stated in the measured work.

**WORKMANSHIP**

G. **GENERALLY**

All screeds and pavings shall be finished smooth, even and truly level unless otherwise specified and paving shall be steel trowelled.

Rendering and plastering shall be finished plumb, square, smooth, hard and even, and junctions between surfaces shall be perfectly true, straight and square.

At the junction of all concrete work and block walling a 150 mm wide strip of expanded metal lathing must be included to avoid plaster cracks.

All arrises and angles shall be clean and sharp or slightly rounded or thumb coved as directed including neatly forming mitres.

All surfaces to be paved or plastered must be brushed clean and well wetted before each coat is applied. All cement pavings and plaster shall be kept continually damp in the interval between application of coats and for seven days after the application of the final coat.

Where dubbing out is required, shall be composed of one part cement to six parts of sand.

Partially or wholly set materials will not be allowed to be used or remixed. The plaster, etc., mixes must be used within two hours of being combined with water.

Preambles
Proposed Toilet Block for IUCN

Plasterwork, etc.

A. SAMPLES

The Contractor shall prepare samples minimum one square metre of each of the screeds, pavings and plastering for the approval of the Architect, after which all work executed shall conform with the approved samples.

B. LIME PLASTERING

Lime plastering shall be carried out in two coats having a total thickness of not less than 15 mm to walls and 10 mm to ceilings.

The first coat shall be trowelled to a perfectly true and even surface and finished with a wood float, the surface being sprinkled with water from a brush during the process and before it has set thoroughly scratched to form a key. The finishing coat shall not be less than 1.5 mm thick, thoroughly worked with a steel trowel, sprinkled with water as before and be brought to a uniform smooth and hard surface.

C. TYROLEAN RENDERING

Tyrolean rendering shall consist of a trowelled backing coat in cement and sand mortar (1:4) gauged with 10% lime, to a thickness of 10 mm and a finishing coat of cement sand mortar (1:4) applied with an approved machine to a thickness of between 5 and 10 mm, to provide an even and uniform texture. Coloured cement or pigment is to be used if so directed by the Architect.

D. GRANOLITHIC AND TERRAZZO PAVING

Granolithic and terrazzo paving shall be spread and well compacted and given only sufficient trowelling to produce a perfectly level surface immediately after laying. When the granolithic or terrazzo has stiffened sufficiently so that a hard surface can be obtained without laitance, then the surface shall be machine ground to a perfectly even and smooth surface. On no account will dusting with neat cement to the surface be permitted.

E. VINYL TILING

Vinyl asbestos floor tiles shall be stored and laid in accordance with the manufacturer's written recommendations using a bitumen-based adhesive. The tiles shall be laid with butt joints straight both ways. Tiling shall start from the centre of a room or area.

F. QUARRY TILES

Quarry tiles shall be bedded in 10 mm thick cement mortar (1:3) with 10 mm joint laid straight both ways. The joints shall be filled with cement mortar neatly flush pointed. The tiles are to be soaked in water before laying.

G. MARBLE TILES AND TERRAZZO TILES

The tiles are to be bedded in 10 mm thick cement mortar (1:3) with fine butt joints. The surface is to be washed and polished on completion.
A. **CERAMIC WALL TILES**

   Wall tiles shall be fixed with a cement-based adhesive with 3 mm wide joints straight both ways. When an area of tile is complete the joints should be grouted with white cement.

B. **BEDS AND BACKINGS**

   Floor screeds shall not be laid in areas exceeding ten square metres during any period of 24 hours. As bays are formed steel edge strips must be used to retain the exposed edge of the screed.

   The thicknesses and mixes of the screeds shall be adjusted to suit the various top dressings and the Contractor must first ascertain what finish is intended to each specified area before the work of laying screeds is put in hand.

   Screeds shall be finished with a wood float for wood blocks and steel trowel for thermoplastic and similar tiles.

C. **MAKING GOOD**

   All making good shall be cut out to a rectangular shape, the edges undercut to form a dovetail key and finished flush with the face of surrounding paving or plaster. Cut out and make good all cracks, blisters, and other defects and leave the whole of the work perfect on completion.

D. **PRICES GENERALLY**

   In addition to the foregoing, prices of superficial items are to include for work in narrow widths, all linear labours, angles and arrises, all fair edges, for making good up to or stopping to a line at the required level at top of skirting or dadoes where directed and for making good up to windows, door frames and similar.

   The prices for all linear items unless otherwise measured are to include for all short lengths, angles and arrises, mitres, and ends of every description.

   Prices for paving are to include for adequate covering and protection during the progress of the Works to ensure that the floors are handed over in perfect condition on completion.

   Prices for all pavings and plastering, etc., shall include for hacking concrete surfaces and for raking out joints of walls 12 mm deep and for cross-scoring undercoats to form a proper key.

   Plastering on walls generally shall be taken to include flush faces of lintels, beams, etc., in same.

E. **PROTECTION**

   The Contractor's rates for all finishings shall allow for adequate protection against damage by all following trades or any other causes, to the satisfaction of the Architect.
Plasterwork, etc.

**GLAZING**

**A. GLASS**

All glass shall be manufactured complying with B.S. 952, free from flaws, bubbles, specks and other imperfections.

Glass panes shall be cut to sizes to fit the openings with not more than 1.5 mm play all round and where puttied shall be sprigged to wood or clipped to metal frames.

Clear sheet glass shall be ordinary glazing (O.Q.) quality. Polished plate glass shall be (G.G.) quality.

Anti-bandit glass shall be 9 mm thick laminated glass of approved type.

**B. PUTTY**

Putty for glazing in wood frames shall be composed of pure linseed oil and powdered whiting free from grittiness in accordance with B.S. 544 Type 1 putty.

Putty for glazing in metal frames shall be quick hard-setting tropical putty specially manufactured for use with steel windows.

Rebates of metal frames receiving glass shall be prepared and treated with primer for putty prior to glazing and putty shall be primed ten days after glazing.

**C. BEDDING STRIPS**

Bedding strips shall be of plastic or washleather approved by the Architect and shall be cut to fit exactly the line of frame and beads.

**D. ON COMPLETION**

Remove all broken, scratched or cracked panes and replace with new to the satisfaction of the Architect. Clean inside and out with an approved cleaner. On no account shall windows be cleaned by scraping with glass.
A. **EXECUTION OF THE WORKS**

The works shall be carried out strictly in accordance with:-

a) By-Laws of the Local Authority  
b) British Standard Code of Practice C.P. 301 : 1971, Building Drainage  
c) British Standard Code of Practice C.P. 310 : 1965, Water Supply  
d) British Standard Code of Practice C.P. 304 : 1968, Sanitary Pipework above Ground  
e) British Standard Code of Practice C.P. 305 : 1974, Sanitary Appliances  
g) All other relevant British Standard Specifications and Codes of Practice (hereinafter referred to as B.S. and C.P. respectively)  
h) The Working Drawings  
i) The Architect's instructions

B. **EXTENT OF THE WORKS**

The Works include, unless otherwise specified, the supply, installation, testing and commissioning, and delivery up clean and in working order of the installations shown on the Drawings and specified in the Specifications, including all details such as:-

- Cold and hot water pipes, discharge pipes (the term discharge pipe is used as a comprehensive all-embracing description in place of the traditional soil and waste terms), drain and ventilating pipes, valves, fire fighting installations and equipment, thermal insulation, etc., and all labour, materials, tools, instruments and scaffolding necessary to execute the work in a first-class manner.

The Contractor shall undertake all modifications demanded by the Authorities in order to comply with the current regulations and produce all certificates, if any, from the Authorities without extra charge.

C. **EXTENT OF THE CONTRACTOR'S DUTIES**

At the commencement of the work, the Contractor shall investigate and report to the Architect the availability of all materials and equipment to be used in the work. If not available, the Contractor shall at this stage place orders for the materials in question and copy the orders to the Architect. Failure to do so shall in no way relieve the Contractor from supplying the specified materials and equipment in time.

The Contractor shall be responsible for verifying all dimensions relative to his work by actual measurements taken on the Site.
A. RECORD DRAWINGS

During the execution of the Works on the Site the Contractor shall, in a manner approved by the Architect, record on Working Drawings and Contract Drawings all information necessary for preparing Record Drawings of the installed Contract Works. Marked-up Drawings and other documents shall be made available to the Architect as he may require for inspection and checking. Record Drawings may, subject to the approval of the Architect, include approved Working Drawings adjusted as a correct record of the installation of the Contract Works.

Record Drawings shall be prepared on approved translucent linen or plastic material suitable for reproduction by the Dyeline process or similar.

B. MATERIALS AND WORKMANSHIP GENERALLY

All materials, equipment and accessories are to be new and in accordance with the requirements of the current rules and regulations where such exist, or in their absence with the relevant B.S.

Uniformity of type and manufacture of equipment or accessories is to be preserved as far as practicable throughout the whole work.

The Contractor shall, if required by the Architect, submit samples of materials to the Architect for his approval before placing an order.

Where a particular item is specified as a particular firm's product "or similar" it is to be clearly understood that this is to indicate the type and quality of the equipment required. No attempt is being made to give preference to the equipment supplied by the firm whose name or products are quoted.

Where particular manufacturers are specified herein, no alternative make will be considered, and the Architect shall be allowed to reject any other makes.

The Contractor will be entirely responsible for all materials, apparatus, equipment, etc., furnished by him in connection with his work, and shall take all special care to protect all parts of finished work from damage until handed over to the Employer.

The work shall be carried out by competent workmen under skilled supervision. The Architect shall have the authority to have any of the work taken down or changed, which is executed in an unsatisfactory manner.

C. TUBING GENERALLY

All tubing exposed on faces of walls shall, unless otherwise specified, be fixed at least 25mm clear of adjacent surfaces with approved holderbats built into walls, cut and pinned to walls in cement mortar; where fixed to woodwork, suitable clips shall be used.

All tubing specified as fixed to ceilings, roofs or roof structures shall be fixed with approved mild steel hangers cut and pinned to ceilings, roofs or roof structures. Where three or more tubes are fixed to ceilings, roofs or roof structures close to each other, they shall be fixed in positions which leave the lower surfaces at the same horizontal level, unless otherwise specified.

Where insulated, tubing shall be fixed with the insulation at least 25mm clear of adjacent surfaces and with at least the same clearance between insulated pipes.
Plumbing

**TUBING GENERALLY (cont'd)**

Tube fixings and supports shall, if nothing else is specified, be arranged at intervals not greater than those given in the following tables:

**Mild Steel Tubing**

<table>
<thead>
<tr>
<th>Diameter of Pipe in mm</th>
<th>Maximum Spacing of Fixing in mm</th>
<th>Horizontal Runs</th>
<th>Vertical Runs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>15</td>
<td></td>
<td>1,800</td>
<td>2,400</td>
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<tr>
<td>20</td>
<td></td>
<td>2,400</td>
<td>3,000</td>
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<tr>
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<td>3,000</td>
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<tr>
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<td></td>
<td>3,000</td>
<td>3,600</td>
</tr>
<tr>
<td>50</td>
<td></td>
<td>3,000</td>
<td>3,600</td>
</tr>
<tr>
<td>65</td>
<td></td>
<td>3,600</td>
<td>4,600</td>
</tr>
<tr>
<td>80</td>
<td></td>
<td>3,600</td>
<td>4,600</td>
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<tr>
<td>100</td>
<td></td>
<td>4,000</td>
<td>4,600</td>
</tr>
</tbody>
</table>

**Unplasticised P.V.C. Pipes**

<table>
<thead>
<tr>
<th>Diameter of Pipe in mm</th>
<th>Maximum Spacing of Fixing in mm</th>
<th>Horizontal Runs</th>
<th>Vertical Runs</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>300</td>
<td>900</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td>400</td>
<td>900</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>400</td>
<td>900</td>
</tr>
<tr>
<td>32 - 152</td>
<td></td>
<td>500</td>
<td>1,200</td>
</tr>
</tbody>
</table>

Each support shall take its due proportion of the weight of the tube or pipe and shall allow free movement for expansion and contraction.

Full allowance shall be made for the expansion and contraction of pipework, precautions being taken to ensure that any forces produced by pipe movements are not transmitted to valves, equipment or plant.

All tubing specified as chased into walls shall have the wall face neatly cut and chased, the tubing wedged and fixed and plastered over.

Where tubing is laid in trenches care shall be taken to ensure that fittings are not strained.

All water systems shall be provided with sufficient drain points to enable them to function correctly. Valves and other user equipment shall be installed with adequate access for operation and maintenance. Where valves and other operational equipment are unavoidably installed beyond normal reach or in such a position as to be difficult to reach from a short step-ladder, extension spindles with floor or wall pedestals shall be provided.

Before any joint is made, the pipes shall be hung in their supports and adjusted to ensure that the joining faces are parallel and any falls which shall be required are achieved without springing the pipe. All formed bends shall be made so as to retain the full diameter of the pipe.
Plumbing

Tubing Generally (continued)

Sleeves shall be provided where tubes pass through walls and solid floors to allow movement of the tubes without damage to the structure. The overall length of the sleeve shall be such that it projects at least 2 mm beyond the finished thickness of the wall or partition.

Tubing shall be cut by hacksaw or other method which does not reduce the diameter of the tube or form a bead or feather which might restrict the flow.

A. GALVANISED MILD STEEL TUBING

Galvanised mild steel tubing shall be in accordance with B.S. 1387 : 1967 with screwed and socketed joints; medium-duty for pipes above ground, heavy-duty for pipes under ground, cast into concrete or chased into walls.

Fittings for same shall be galvanised malleable iron to B.S. 1940 : 1965, with threads to B.S. 21 : 1957

Joints shall be made with fine hemp and an approved jointing compound or tape. Compound containing red lead must not be used.

Long screw connectors and flat-faced unions shall not be used, unless otherwise specified.

Where laid underground or cast in concrete, galvanised mild steel tubing shall be protected by "Densotape" or similar, wound on at least two layers thick, or given two coats of approved bitumen. Minimum earth cover to underground tubing shall be 450 mm.

Where chased into walls or cast in concrete, galvanised mild steel tubing carrying hot water shall be wrapped with hair felt secured by copper wire.

The fixing of galvanised mild steel tubing shall use:-

a) Malleable iron "schoolboard" pattern brackets for building in or for screwing to structure,

or  b) Malleable iron pipe rings, with either back plate, plugs or girder clips;

or  c) Purpose-made straps to the Architect's approval.
Plumbing

A. **UNPLASTICISED P.V.C. PIPES**

Unplasticised P.V.C. discharge and ventilating pipes and fittings shall be to B.S. 4514: 1964, Grade 2

U.P.V.C. ventilating pipes passing through roofs shall terminate at least 300 mm above the roof level and shall be protected against insect penetration by a copper wire mosquito-proof balloon grating securely bound on the top of the pipe with stout copper wire.

Joints for U.P.V.C. discharge and ventilating pipes shall be spigot and socket joints which incorporate synthetic rubber rings or they shall be closely fitting spigots and sockets jointed together by means of a solvent solution provided by the pipe maker.

Joints of U.P.V.C. discharge and ventilating pipes to cast iron drain pipes shall be by means of purpose-made cast iron sleeves jointed with tarred yarn and fibrous lead yarn properly caulked into the wetted sockets. Joints to pitch fibre drain pipes shall be made with approved adaptors.

The fixing of U.P.V.C. pipes shall use holderbats of metal, or plastic-coated metal, care being taken that they do not damage the pipe when tightened. Where anchor points are specified to control thermal movement, the holderbats shall be fitted on the pipe sockets. Intermediate holderbats fitted to the pipe barrel shall be such as to allow thermal movement to take place.

At the foot of all U.P.V.C. ventilating stacks and where shown on the Drawings and in other positions as directed or necessary for cleaning, inspection pipes with door shall be provided, with a bolted oval recess door, shaped internally to bore of pipe.

B. **VALVES, COCKS, TAPS, ETC.**

Draw-off taps and stop valves shall comply with B.S. 1010 : 1959.

Brass ball valves shall comply with B.S. 1212 : 1953 and copper floats for ball valves shall comply with B.S. 1968 : 1953, and plastic floats for same shall comply with B.S. 2456 : 1954

Sluice valves shall comply with B.S. 1218 :1946

Gate valves on main supply shall comply with B.S. 3465.

Manually operated mixing valves for ablutionary and domestic purposes shall comply with B.S. 1415 : 1955

Drain taps shall comply with B.S. 2879 : 1957

Safety valves, stop valves and other safety fittings for air receivers and compressed air installations shall comply with B.S. 1123 : 1961

Safety valves for thermal storage water heaters shall comply with B.S. 959 : 1967

Preambles
A. THERMAL INSULATION
Thermal insulating material for hot and cold water supply installation shall conform to B.S. 1334 : 1966, unless otherwise specified. The Contractor shall ensure that the thermal insulating materials used conform to the requirements of the Local Fire Authority.

All thermal insulating materials shall be delivered to the Site in a dry condition and housed in a store until drawn upon for use.

All surfaces to be insulated shall be cleaned carefully before fixing the insulating material.

The installation of insulating materials shall be entrusted only to operatives skilled in the work. All insulating material, however fixed, shall be in close contact with the surface to which it is applied and all joints shall be sealed after ensuring that edges or ends of any section are built up close to one another. Edges or ends shall be cut or sharpened on site as necessary. Supporting bands shall be either non-corrodible material or adequately protected against rust.

Each pipe or item shall be insulated separately.

Fixing of insulating material shall suit the progress of other installation works in the building.

Insulation, where pipes are fixed exposed, shall be pre-formed rigid sections with approved finish. Where pipes are fixed in close ducts, above false ceilings, etc., mats cut in suitable sections on the site shall be used, well secured with copper or galvanised wire, finally covered with asphalt roofing paper.

Where subject to outside weather or other potentially damp or wet conditions, the insulation shall be adequately protected against moisture pick-up.

If nothing else is specified, the minimum thickness of insulating material for cold and hot water pipes shall be as specified in B.S. 1588 : Table 1.

B. SANITARY APPLIANCES
The installation of sanitary appliances shall be in accordance with C.P. 305 : 1952 and B.S. 3202 : 1959.

The appliances shall be fixed in the positions shown on the Drawings or as directed by the Architect.

For all sanitary appliances, the necessary number of supports, brackets, plugs, screws, washers, jointing materials, etc., shall be provided.

Where supports, brackets, etc., are screwed to wall or structures, "Rawlplugs" or similar shall be used.

Notraps for any appliance whatsoever shall have a seal less than 75 mm.

Fixing shall, if required by the Architect, include for temporarily erecting appliances in the required position of service and discharge pipes, taking down, storing and permanently fixing after completion of wall finishings and connecting to service and discharge pipes.

Care shall be taken at all times and particularly after fixing, to protect appliances from damage.

Upon completion of the work, all appliances shall be cleaned of plaster, paint, etc., and carefully examined for defects.

Preambles
A. FIRE FIGHTING EQUIPMENT
The specified fire fighting equipment shall be supplied and installed by the Contractor in the position shown on the Drawings.

Portable fire extinguishers shall comply with the following B.S.:

a) Water type (soda acid) - B.S. 138 : 1948
b) Foam type (chemical) - B.S. 740 : Part 1 : 1948
c) Foam type (gas pressure) - B.S. 740 : Part 2 : 1952
d) Water type (gas pressure) - B.S. 1382 : 1948
e) Halogenated hydrocarbon type (carbon tetrachloride and chlorobromomethane) - B.S. 1721 : 1968
f) Carbon dioxide type - B.S. 3326 : 1960
g) Dry powder type - B.S. 3465 : 1962
h) Water type (stored pressure) - B.S. 3709 : 1964

Fire hose couplings and ancillary equipment shall comply with B.S. 336 : 1965

Hose reels: Hoses to be 20 mm reinforced red rubber canvas double braided, to comply with B.S. 3169 : 1970. Waterway pressure castings machined throughout. Hose plates 560 mm diameter steel. Inlet valve with inlet screwed 3/4" B.S.P. Controllable plastic jet spray nozzles to give instantaneous finger-tip control of spray pattern and shut-off. Test pressure : 2.5 Kg/square centimetre. Finish fire red.

The installation of fire extinguishers shall be in accordance with C.P.402: Part 3: 1964

B. TESTING
The whole of the water and discharge installation shall be tested to the satisfaction of the Architect and the Local Authority. The Contractor shall provide all necessary testing apparatus and facilities for testing the installations and any defective work shall be replaced immediately and shall be the subject of re-testing until found satisfactory.

Where pipes are to be lagged, chased into walls or otherwise concealed, the work shall be tested prior to lagging, making good chases, etc.

All hot and cold water installations shall, if nothing else is specified, be tested to 1.5 times normal working pressure, minimum 4KG/cm squared; and compressed air systems tested with minimum 10 Kg/cm squared.

The test pressure shall be applied be means of a manually-operated test pump or, in the case of long mains or mains of large diameter, by a power-driven test pump. Pressure gauges shall be recalibrated before the test.
Plumbing

TESTING (Cont'd)

The test pressure shall be maintained by the pump for about one hour and a leak as specified in C.P. 310, Section 502 J, shall be approved, but any visible individual leak shall be repaired.

Valves, cocks and taps shall be absolutely tight under the test pressure for the corresponding pipes as well as under a small pressure.

Testing of discharge pipes shall be carried out as specified in C.P. 304, 1968.

Testing drain pipes shall be carried out in accordance with C.P. 301 : 1950

Tests shall, if necessary, be done in sections as work proceeds without extra payment.

All tests shall be carried out in the presence of a representative of the Local Authority and/or the Architect or his representative.

Upon completion of the work, including re-testing if necessary, the installation shall be thoroughly flushed out.

A. STERILISATION OF WATER SUPPLY PIPES

Sterilisation shall be carried out strictly in accordance with C.P. 310 : 1965. The sterilisation will not be approved unless the final test for residual chlorine mentioned in the above C.P. proves positive.

B. COMMISSIONING

Before handing over, the Contractor shall confirm that the installation has been examined, tested, is ready for use, that it will operate and can be maintained efficiently.

When handing over, the Contractor shall demonstrate to the Employer the methods of operation, limitations, and the maintenance requirements and safety precautions to be observed; and shall also hand over any tools for operating, cleaning, testing and maintenance of the installation

On acceptance the Contractor shall provide the Employer with operation and maintenance instructions and any other documents or information appropriate to the installation.

C. MEASUREMENT

Prices for tubing shall include for all short lengths and sockets. Connectors, elbows, bends, formed bends, tees, reducing pieces and other fittings are measured separately and are to include for any extra joints and other extra labour required. The prices for the reducing tees shall include for any extra reducing pieces which may be required, if the correct reducing tee is not available.

All pipes have been measured over all bends, tees and other fittings and the Contractor shall include in his prices for all cutting and waste.
Preambles
Plumbing

DRAINAGE

A. SETTING OUT

Lines of drains shall be accurately set out and trenches excavated and bottoms trimmed to accurate gradients to approval before pipelaying commences.

B. DRAIN TRENCHES

Excavation shall be made to such depths and dimensions as may be required by the Architect to obtain proper falls and firm foundations. No permanent construction shall be commenced on any bottom until the excavation has been examined and approved by the Architect. Should the Contractor in error, or without the instructions of the Architect, make any excavation below the required level of the drain or bed, as the case may be, he will be required to refill such excavation to the correct levels with Class 15 concrete at his own expense.

Prices for excavation must include for excavating in all materials met with and for trimming bottoms to the necessary falls and for any extra excavation required for planking and strutting and working space, all as described under "Excavation". Excavation in hard rock requiring the use of the compressors or wedging is measured separately.

C. KEEP EXCAVATION DRY

The Contractor shall keep the whole of the trenches or other excavations free from water, and he shall execute such works and install such pumps as may be required to keep the excavations dry at all times. No subsoil water shall be discharged into the sewers without the written permission of the Architect.

D. UPVC DRAIN PIPES AND FITTINGS

UPVC drain pipes and fittings shall comply in all respects with B.S. 4660, golden brown in colour and with jointing by lip seal socketted fittings. The natural rubber for lip seal joints shall be to B.S. 2494. Laying and jointing shall be carried out strictly in accordance with the Manufacturer's instructions. Pipe barrels shall be continuous contact with the trench bed when laid.

All materials for bed and side fill to UPVC drain pipes shall be hard granular material passing 20 mm sieve and containing not more than 5% fines passing 3 mm sieve, composed of crushed stone, quarry waste, ballast or gravel with a compaction factor of 0.3 or less.

E. CAST IRON DRAIN PIPES

Cast iron drain pipes shall be coated cast iron spigot and socket pipes conforming with B.S. 437 in all respects and with fittings to B.S. 1130. Pipes shall be jointed with asbestos yarn and caulked with molten lead or jointed with special jointing compound, all to approval.

F. SPUN CONCRETE CYLINDRICAL DRAIN PIPES AND FITTINGS

Spun concrete drain pipes shall be to B.S. 556, Part 2, of approved manufacture.

Flexibly jointed pipes shall have spigot and socket joints made with rubber joint rings to B.S. 2494, Part 2. Rigidly jointed pipes shall have spigot and socket joints made with proprietary rubber gasket or three turns of tarred gaskin or tallowed yarn caulked to not more than one quarter of the socket joint and cement mortar 1:2 struck off at 45 degrees.
A. **uPVC DRAIN PIPES AND FITTINGS**

uPVC Drain pipes and Fittings shall be to B.S. 4660 of approved manufacture, with lip seal socketed joints, laid strictly in accordance with the manufacturers' instructions.

B. **BACKFILLING**

The first backfilling of pipe trenches is to be of soft material free from stones and shall be watered and carefully tamped over and around the pipes in 300 mm layers until they are covered to a depth of 600 mm. Subsequent filling is to be in 150 mm layers, watered and rammed. Only materials approved by the Architect are to be used as backfilling.

Where hardcore is used for backfilling it is not to exceed 150 mm gauge and all interstices shall be properly filled with small pieces and fine binder. Surplus excavated materials are to be removed from the Site.

If, in the opinion of the Architect, care has not been exercised in refilling trenches, he may order a fresh test to be made on the drain. In the event of the drain failing to pass the test the Contractor will be required to remedy the fault at his own expense.

C. **CONCRETE BEDS AND SURROUND**

Concrete beds and surrounds shall be Class 25 concrete to the thicknesses and widths specified.

Where pipes are specified to be haunched, the concrete shall be carried up from the outside edge of the bed to meet the pipe barrel tangentially.

Where pipes are specified to be surrounded, the concrete shall be carried up from the bed in a square section with a minimum of 150 mm in thickness over the barrel of the pipe.

Rates for beds and surrounds shall include for forming recesses and filling with concrete, for mortar layer, etc., and for any necessary formwork.

D. **LAYING PIPES**

Each pipe shall be carefully examined on arrival, any defective pipes shall be removed immediately from the Site and not used in the Works. Minor damage to the protective coating of cast iron pipes shall be made good by painting with hot tar; if major defects in the coating exist, such pipes shall be rejected and removed from the Site.

Drains shall be laid in straight lines and to even gradients as required and to the satisfaction of the Architect.

Great care shall be exercised in setting out and determining the levels of the pipes and the Contractor shall provide suitable instruments and set up and maintain all sight rails, boning rods and bench marks, etc., necessary for the purpose.

All drains shall be kept free from earth, debris, superfluous cement and other obstructions or water during laying and until completion of the Contract when they shall be handed over in a clean condition.

Pipes shall be laid with the sockets leading uphill and shall rest on solid and even foundations for the full length of the barrel. Socket recesses shall be formed in the foundation, as short as practicable but sufficiently deep to allow the pipe jointer room to work right round the pipe. Such recesses shall be filled with cement mortar (1:4) on completion of laying.
Preambles
Drainage

A. **INSPECTION CHAMBERS**
Inspection chambers shall be constructed in the positions indicated on the Drawings or as required by the Architect. Such chambers shall be to the depths required to obtain even gradients in the drain and of sufficient size to contain the requisite main channel and any branches thereto and all to the entire satisfaction of the Architect and the Local Authority.

Rendering shall be trowelled smooth, coved at all internal angles and rounded on arrises.

B. **TESTING**
Each length of drain and manhole shall be tested as described hereinafter and approved by the Engineer before any backfilling of the trench takes place.

Testing shall not be carried out until at least 12 hours have elapsed after the jointing of the last pipe.

The test shall be as follows:-

(i) The lower end of the pipe and all junctions shall be securely stopped and the whole length under test filled with water.

(ii) When full, a further stopper shall be inserted at the top leaving a pipe attached to the drain plug. This pipe shall be bent through 90 degrees and shall terminate in a header tank 225 mm square. The vertical distance between the centre line of the drain plug and the top of the header tank shall be not less than 900 mm.

(iii) Water shall then be poured into the header tank which shall be kept full for a minimum period of 3 hours to allow absorption to take place. At the expiration of this period the header tank shall be topped up and the testing of the drain commenced. If, after a further period of 30 minutes, the water level in the header tank has not fallen by more than 2 mm the test will be considered satisfactory.

(iv) In the event of a pipe failing to withstand the test, the point of failure shall be completely surrounded, at the Contractor’s expense, with Class 25 concrete 19 mm maximum aggregate, so that there is a minimum cover of 150 mm in all directions. The length shall then be re-tested.

(v) Immediately a length of drain has been approved the trench shall be backfilled for a depth of at least 300 mm above the top of the pipes.

C. **GULLEYS**
Gulleys shall be approved 100 mm salt glazed stoneware or cast iron trapped gulleys with 150 x 150 mm cast iron gratings to receive the wastes from waste fittings. Bed the gulleys on and surround with Class 25 concrete 100 mm thickness, carried up to form a 75 x 75 mm kerb with all exposed surfaces finished in cement and sand (1:2) trowelled hard and smooth and all angles rounded. Make good cement joint to drain pipe and run drain to adjacent manhole.

D. **MEASUREMENT**
Drain pipes have been measured over all bends, junctions and other fittings, and the Contractor shall include in his prices for all joints, short lengths, cutting and waste. Prices for bends, junctions, etc., shall include for the extra joints, cutting and waste and any extra labour required.

GD/56
PAINTING AND DECORATING

A. APPROVED SPECIALIST
All work under this trade must be executed by an approved Specialist.

B. GENERALLY
The Contractor shall so arrange his programme of work that all other trades are completed and away from the area to be painted, when painting begins. Before painting the Contractor must remove all concrete and mortar droppings and the like from all work to be decorated and remove all stains from and obtain uniform colour to work to be oiled and polished.

All plaster, metal, wood or other surfaces which are to receive finishes of paint, stain, polish, distemper or paintwork of any description are to be carefully inspected by the Contractor before he allows any of his painters to commence work. The Contractor will be held solely responsible for all defective work condemned as a result of his Painter's failure to insist on receiving from the other trades surfaces in the proper condition to allow first-class finishes of the various kinds specified being applied to them.

C. PAINTING GENERALLY
All materials are to be of the best quality and shall be of an approved proprietary brand selected from the latest Schedule of Approved Paints issued by the Ministry of Works.

All materials to be applied externally shall be of exterior quality and/or recommended by the manufacturers for external use.

All materials shall be delivered on Site intact in the original sealed drums or tins and shall be mixed and applied strictly in accordance with the manufacturers' instructions and to the approval of the Architect.

Unless specially instructed or approved by the Architect, no paints, distemper, etc., are to be thinned, or otherwise adulterated, but are to be used as supplied by the manufacturers and direct from the tins.

If required by the Architect the Contractor is to provide at his own expense samples of paints, etc., with containers and cases to be forwarded carriage paid by the Contractor for analysis to a laboratory.

The priming, undercoats and finishing coats shall each be of differing tints and the priming and undercoat shall be the correct brands and tints to suit the respective finishing coats, in accordance with the manufacturer's instructions. All finishing coats shall be of colours and tints selected by the Architect. Each coat must be approved by the Architect before the next coat is applied.

Each coat shall be properly dry and in the case of oil or enamel paints shall be well rubbed down with fine glass paper before the next coat is applied. The paintwork shall be finished smooth and free from brush marks.

Colour cards of all paints, etc., shall be submitted to, and samples prepared for approval of the Architect before laying on, and such samples, when approved, shall become the standard for work.

All paints, emulsion paints, and distempers shall be applied by means of a brush or spray gun or rollers of an approved type, where so agreed by the Architect.

No painting is to be done in wet weather or on surfaces which are not thoroughly dry.
Preambles
Painting, etc.

Painting Generally (Cotn'd)
Prices of paint, distemper, etc., shall include for preparation of surfaces, rubbing down between each coat, stopping, knotting, etc., and all other work in connection and as described and as necessary to obtain a first-class and proper finish to approval.

Emulsion paint on ceilings and all undercoats of emulsion paint and complete oil painting on walls shall be completed before thermoplastic floorings are laid. Final coats of emulsion paints on walls shall be applied after such flooring has been laid complete.

A. SAMPLES

The Contractor shall furnish at the earliest possible opportunity before work commences and at his own cost, samples of painting for the Architect's approval and any further samples in the case of rejection until such samples are approved by the Architect and such samples, when approved, shall be the minimum standard for the work to which they apply.

The Architect may reject any materials or workmanship not in his opinion up to the approved sample, and these must be removed from the Site without delay.

B. WOOD PRESERVATIVE

All woodwork in contact with walling or plaster shall be treated after cutting and preparation but before assembly or fixing with one coat of "TIMCIDE" wood preservative manufactured by Timsales Ltd., P.O. Box 18080, Nairobi. The solution is to be brushed on all faces of all timbers, unless exposed to view and painted.

The Contractor shall note that this solution is POISONOUS and shall take all necessary precautions and instruct his workmen accordingly.

C. WAX POLISH

Wax polish shall be furniture polish of an approved brand and wood surfaces shall be clean, smooth, free from oil or grease or any other blemishes. A minimum of two coats shall be applied to approval.

D. PREPARATION AND PRIMING OF PLASTER, ETC., SURFACES

Plaster surfaces shall be perfectly smooth, free from defects and ready for decoration. All such surfaces shall be allowed to dry for a minimum period of six weeks, stopped with approved plaster compound stopping and rubbed down flush, as necessary, and then be thoroughly brushed down and left free from all efflorescence, dirt and dust immediately prior to decorating.

Plaster surfaces which are to be finished with emulsion, oil or enamel paint, shall be primed with an alkali resisting primer complying with the particular paint manufacturer's specification and applied in accordance with their instructions.

Fibreboard or similar surfaces shall be lightly brushed down to remove all dirt, dust and loose particles and have all nail holes or other defects stopped with an approved plaster compound stopping rubbed down flush and left with a texture to match surrounding material and shall receive one coat petrifying liquid as last.
A. **PREPARATION AND PRIMING OF METAL, ETC., SURFACES**

All surfaces shall be thoroughly brushed down with wire brushes and scraped where necessary to remove all scale, rust, etc., immediately prior to decorating. Where severe rust exists and if approved by the Architect a proprietary de-rusting solution may be used in accordance with the manufacturer's instructions.

Shop-primed and unprimed surfaces shall be given one coat of metal chromate primer.

Galvanised surfaces shall be treated before painting with an approved proprietary mordant or de-greasing solution before priming.

Coated surfaces already treated with bituminous solution shall be scraped to remove soft parts and then receive two isolating coats of aluminium primer or other approved anti-tar primer.

B. **PREPARATION AND PRIMING OF WOODWORK**

All woodwork shall be rubbed down, all knots covered with a thick coat of good shellac or aluminium knotting; primed with one coat of approved ready-mixed proprietary wood primer and all cracks, nail holes, defects and uneven surfaces, etc., stopped and faced up with hard stopping rubbed down flush.

C. **PREPARATION OF PREVIOUSLY PAINTED METAL SURFACES**

Thoroughly wash down with water containing an approved cleansing agent and rinse with clean water. Wire brush to remove all rust and loose paint and touch up bare patches with zinc-rich primer.

D. **PREPARATION OF PREVIOUSLY PAINTED WOODWORK**

Thoroughly wash down with water containing an approved cleansing agent and rinse with clean water. Lightly rub down with glass paper and prime and bring forward all bare patches for decoration.

E. **PREPARATION OF PREVIOUSLY PAINTED PLASTER, ETC., SURFACES**

Thoroughly wash down with water containing an approved cleansing agent and rinse with clean water. Cut out small cracks and other blemishes and fill with an approved plaster compound stopping rubbed down flush. Bring forward all bare patches for decoration.

F. **EMULSION PAINT**

After preparation as specified above a minimum of THREE coats, unless otherwise specified, shall be applied using a thinning medium of water only if and as recommended by the manufacturer.

An approved plaster primer tinted to match may be substituted for the first coat in three-coat work.

G. **ENAMEL PAINT**

Apply two undercoats and one finishing coat, after preparation and priming as specified above.
Preambles
Painting, etc.

A. **CLEAR POLYURETHANE VARNISH**

Surfaces are to be treated with "Ronseal" or other equal and approved, in three coats. The first coat is to be applied with a linen pad and well rubbed in and second and successive coats are to be applied by brush. The first and second coats are to be lightly rubbed with Grade 'O' and Grade 'OO' wire wool respectively.

B. **POLYURETHANE CLEAR LACQUER**

To be applied strictly as per the manufacturer's instructions.

C. **IRONMONGERY**

All ironmongery shall be removed from joinery, steel windows and louvres before painting is commenced, and shall be cleaned and renovated if necessary and refixed after completion of painting.

D. **PAINTING ITEMS**

Painting items as billed hereafter shall include for preparing all priming surfaces as above described.

E. **COVER UP**

Cover up all floors, fittings, etc., with dust sheets when executing all painting and decorating work.

F. **CLEAN AND TOUCH UP**

Paint splashes, spots and stains shall be removed from floors, woodwork, etc., any damaged surfaces touched up and the whole of the work left clean and perfect upon completion.
EXTERNAL WORKS

DRIVEWAY AND PARKING AREAS

A. EXCAVATIONS
Excavations to areas to receive bitumen macadam or other road or paved finish shall be carried out in a manner ensuring that excavation plant and vehicles do not cause shear failure more than 250 mm in the sub-grade. Wheel loads and tyre pressures shall be limited and work shall be interrupted to let the sub-grade dry out as necessary to avoid such sub-grade failure.

If shear failure more than 250 mm deep occurs in the sub-grade, the soil affected shall be excavated and replaced by soil filling as described.

If the soil develops a highly elastic condition as excavation approaches formation level, excavations shall be interrupted until the excess pore consequently disappears.

Before any further work is executed the formation level must be inspected and approved by the Engineer.

B. COMPACTION
The sub-grade shall be compacted by a smooth-wheeled roller of 8 to 10 tonnes weight or vibrating roller of minimum 1,300 Kg., or other approved plant. The number of coverages shall be at least 10 and there shall be a 50% overlap of successive coverages. If so instructed by the Engineer, water shall be added during compaction to obtain optimum water content. Filling shall be compacted as above but in maximum 200 mm deep layers.

C. SUB-GRADE SURFACE FINISH
The surface of the sub-grade shall be finished to the levels, falls and crossfalls shown on the Drawings within the following tolerances:

(i) The level shall not be above and not more than 50 mm below the level shown on the Drawings.

(ii) The falls shall be within 10% of the falls shown on the Drawings.

(iii) The smoothness shall be such that departures from a 3 metre straight edge laid in any direction shall not exceed 50 mm and there shall be no ponding of water.

D. COARSE AGGREGATE
Coarse aggregate for the base shall be crushed stone or rock conforming to the following requirements:

(i) It shall be from sound, hard, igneous rock, limestone, quartzite or hard coral, and shall be free from weathered or disintegrated stone, clay, organic or other foreign matter.

(ii) The shape shall be roughly cubical and the grading shall conform to:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 mm</td>
<td>100%</td>
</tr>
<tr>
<td>38 mm</td>
<td>20 - 80%</td>
</tr>
<tr>
<td>19 mm</td>
<td>0 - 20%</td>
</tr>
</tbody>
</table>
A. **CRUSHER DUST**

Crusher dust shall mean material in accordance with the table for 5 mm nominal maximum size below.

<table>
<thead>
<tr>
<th>B.S. Sieve Size</th>
<th>Percentage Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 mm</td>
<td>100</td>
</tr>
<tr>
<td>No. 7</td>
<td>80 - 100</td>
</tr>
<tr>
<td>No. 14</td>
<td>50 - 80</td>
</tr>
<tr>
<td>No. 25</td>
<td>30 - 60</td>
</tr>
<tr>
<td>No. 52</td>
<td>20 - 45</td>
</tr>
<tr>
<td>No. 200</td>
<td>10 - 25</td>
</tr>
</tbody>
</table>

**Notes:-**

(i) Not less than 10% shall be retained between each pair of successive sieves specified for use, excepting the largest pair.

(ii) The material passing the No. 36 sieve shall have the following characteristics (B.S.377):-

- Liquid Limit not exceeding 25%
- Plasticity Index not exceeding 8%

B. **CRUSHER FINES (2 to 10 mm)**

All the material in crusher fines shall pass the 13 mm B.S. sieve and be retained on the No. 25 B.S. sieve, evenly graded with no excess of any size.

C. **SUB-BASE**

The material for use in the sub-base shall consist of crusher dust as described, or other approved material. It shall be placed in one layer of such thickness that when compacted it shall attain the finished thickness shown on the Drawings. The material shall be watered as necessary and compacted as described. The sub-base material shall have a CBR value (unsoaked) of not less than 25.
Preambles
External Works

A. BASE

The material for use in the basecourse shall consist of one layer of coarse aggregate as described of which the interstices are filled with fine material consisting either of crusher dust or a mixture of crusher fines. The proportions of crusher dust and crusher fines in the fine material shall be such as to obtain the maximum density of basecourse when compacted.

The procedure for construction shall be as follows: The coarse aggregate shall be placed in a layer of such thickness so as to obtain the required thickness after compaction. It shall then be compacted lightly until the Engineer is satisfied that a layer true to shape and level has been obtained. The fine material shall then be spread over the layer by hand or by mechanical means. The application of fine material shall be made gradually in successive layers not exceeding 25 mm in thickness and each layer shall be worked into the voids in the coarse aggregate before the application of the succeeding layer. The fine material shall be laid as described and brushed into the coarse aggregate and rolled and consolidated by an approved vibrating roller to feed fines to the bottom of the layer.

Additional blinding material shall be applied as above until the surface will accept no more. In no case shall the blinding material be applied so thickly that it cakes or bridges on the surface in such a manner as to prevent the direct bearing of the roller or other compacting plant on the stones.

Final compaction shall be by an 8 - 10 tonnes smooth-wheeled roller until there is no visible movement under the action of the roller and until the required tolerances are achieved. Water may be applied during final compaction subject to the Engineer's approval.

Compaction shall in any case achieve 100% maximum dry density in accordance with B.S. 1377.

B. QUARRY WASTE

Quarry waste shall mean material to the same specification as crusher dust, except as follows:-

(i) The Plasticity Index taken on material passing the No. 36 sieve shall not exceed 16%

(ii) The material may have up to 35% of stones not larger than 38 mm, provided that the material passing the 5 mm sieve is within the limits specified.

Quarry waste shall be clean and completely free from earth, organic or other foreign matter.

C. BASECOURSE FINISH

The surface of the basecourse shall be finished to the levels, falls and crossfalls shown on the Drawings subject to the following tolerances:-

(i) The level shall be within + or - 12 mm of the levels shown on the Drawings.

(ii) The falls shall be within 10% of the falls shown on the Drawings.

(iii) The smoothness shall be such that departures from a 3 metre straight edge laid in any direction shall not exceed 12 mm.

The surface of the basecourse shall be inspected and approved by the Engineer before bitumen paving is commenced.
A. **BITUMEN PRIMING COAT**

Immediately before applying the priming coat, the surface of the base course shall be brushed free from dust and loose stones. The material for the priming coat shall be cutback bitumen of M.C.O. grade or other approved.

Approximately 30 minutes before applying the priming coat the surface of the base course should be made slightly damp by use of a water spray. The priming coat shall be applied at a temperature of 100 - 150 degrees Fahrenheit and at a rate of 0.60 litres per square metre.

After application of the primer, a period of at least two days shall elapse before the road surfacing is applied. During this period all traffic shall be kept off the treated surface.

B. **BITUMEN MACADAM SURFACING**

A single course open graded premix of 30 mm to 40 mm compacted thicknesses shall be used, with a seal coat.

Coarse aggregate shall be crushed blacktrap with particles having a cubicle shape to the Engineer's approval and shall be washed free from dust.

The coarse aggregate gradings shall be:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percentage Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 mm</td>
<td>100</td>
</tr>
<tr>
<td>13 mm</td>
<td>60 - 100</td>
</tr>
<tr>
<td>10 mm</td>
<td>45 - 70</td>
</tr>
<tr>
<td>6 mm</td>
<td>30 - 50</td>
</tr>
<tr>
<td>4 mm</td>
<td>25 - 40</td>
</tr>
<tr>
<td>4 mesh</td>
<td>15 - 25</td>
</tr>
<tr>
<td>8 mesh</td>
<td>2 - 5</td>
</tr>
<tr>
<td>200 mesh</td>
<td></td>
</tr>
</tbody>
</table>

The binder shall be Shellmac MC/RC2 or other approved. The percentage by weight of binder shall be 4.5%. Mixing shall be in an approved mixer and mixing shall proceed until the stone is evenly coated with binder. The temperature (at mixing) shall be within the following range:

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>Binder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixing Temperature:</td>
<td>50° - 95°F</td>
</tr>
<tr>
<td></td>
<td>125° - 150°F</td>
</tr>
</tbody>
</table>

The laying temperature shall be not less than 20° F below the mixing temperature.

The mix shall be spread evenly over the primed surface and shall be thoroughly compacted by rolling with a minimum of 6 passes. A smooth- wheeled roller of not less than 5 tonnes weight and with rear wheel
loading of 0.25 Kg. per square millimetre width shall be used.

Preambles
Extemal Works

A. ROLLING
Any longitudinal joints shall be rolled first, after which rolling shall start longitudinally at the side and proceed towards the centre of the carpet. Each pass of the roller shall overlap the preceding one by at least one half width of the rear wheel. Alternate passes of the roller shall be of varying length. Immediately following initial compaction, the surface shall be checked with a straight edge to ensure that it meets the surface finish requirements. Minor variations shall be corrected by rolling, but major imperfections shall be compacted by adding or taking away mix while it is still workable.

B. SURFACE FINISH
The surface of the bitumen macadam shall be finished to the levels, contours and slopes shown on the Drawings with the following tolerances:

(i) The level shall be within + or - 6 mm of the level shown on the Drawings.

(ii) The gradient shall be within 10% of the gradient shown on the Drawings.

(iii) The smoothness shall be such that departures from a 3 metre straight edge laid in any direction shall not exceed 6 mm.

C. SEAL COAT
The seal coat shall consist of precoated fines consisting of crushed blacktrap stone graded from 3 mm to dust, or coarse sand. The binder shall consist of 4.5% by weight of MC/RC2. The seal coat shall be spread and brushed into the macadam surface at the rate of 180 square metres per tonne and compacted by rolling as for the macadam.

FENCING

D. CONCRETE POSTS AND STRUTS, GENERALLY
Concrete posts and struts shall be manufactured to BS 1722:Part 1, Appendix A by an approved manufacturer, using Concrete Class 20 (10 mm), and reinforced in accordance with the following table:

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate posts not exceeding 2450 mm long</td>
<td>4No. 6mm bars</td>
</tr>
<tr>
<td>Intermediate posts exceeding 2450 mm long</td>
<td>4No. 8mm bars</td>
</tr>
<tr>
<td>Straining posts not exceeding 2450 mm long</td>
<td>4No. 8mm bars</td>
</tr>
<tr>
<td>Straining posts exceeding 2450 mm long</td>
<td>4No. 10mm bars</td>
</tr>
<tr>
<td>Struts not exceeding 2450 mm long</td>
<td>4No. 6mm bars</td>
</tr>
<tr>
<td>Struts exceeding 2450 mm long</td>
<td>4No. 8mm bars</td>
</tr>
</tbody>
</table>

Bars shall be made up into cages with 12 swg stirrups at centres not exceeding 380 mm. Bars shall extend to 25 mm from the end of the post or strut and have minimum cover of 16 mm.
A. **CONCRETE POSTS AND STRUTS FOR CHAINLINK FENCES**

Concrete posts and struts for chainlink fences shall be to B.S. 1722: Part 1, Table 3.

B. **CONCRETE POSTS AND STRUTS FOR STRAINED WIRE FENCES**

Concrete posts and struts for strained wire fences shall be to B.S. 1722: Part 3, Table 2.

C. **STEEL ANGLE POSTS AND STRUTS GENERALLY**

Steel angle posts and struts shall be to B.S. 1722: Part 1 & 3. Angles shall be to B.S. 4: Part 1 and B.S. 4360 with ends ragged for casting in and supplied primed with one coat of red oxide to B.S. 2524.

D. **STEEL HOLLOW SECTION POSTS AND STRUTS**

Steel hollow section posts and struts shall be to B.S. 1722: Part 1 & 3. Sections shall be to B.S. 4: Part 2 and B.S. 4360 with ragged ends for casting in and supplied primed with one coat of red oxide to B.S. 2524.

E. **STEEL TUBE POSTS AND STRUTS**

Steel tubes for posts and struts shall be to B.S. 1775, with ragged ends for casting in and supplied primed with one coat of red oxide to B.S. 2524.

F. **STEEL ANGLE, HOLLOW SECTION AND TUBE POSTS AND STRUTS FOR CHAINLINK FENCING**

Steel angle, hollow section and tube posts and struts for chainlink fencing shall be to B.S. 1722: Part 1, Tables 4A and 4B.

G. **TIMBER POSTS AND STRUTS FOR STRAINED WIRE FENCING**

Timber posts and struts for strained wire fencing shall be cedar of diameters specified, reasonably straight and free from bark and excessive sapwood with tops cut at a slight angle to shed water. Straining posts shall be notched for struts.

H. **GALVANISED LINE WIRE**

Galvanised line wire for chainlink fencing shall be B.S. 4102 of the following diameters:-

- Medium pattern chain link 3 mm
- Heavy pattern chain link 3.55 mm
- Extra heavy pattern chain link 4 mm

Galvanised line wire for strained wire fencing shall be to B.S. 4102 and 4mm diameter.
Preambles
External Works

A. **GALVANISED TYING WIRE**

Galvanised tying shall be to B.S. 4102 and 2 mm diameter.

B. **GALVANISED BARBED WIRE**

Galvanised barbed wire shall be to B.S. 4102 of two strands of 2.5 mm line wire with barbs of 2 mm point wire at centres not exceeding 90 mm.

C. **GALVANISED CHAINLINK**

Galvanised chainlink shall be to B.S. 4102: Table 6 of the pattern specified, of 50 mm mesh and of the following wire diameters:

- Medium pattern chain link 2.5 mm
- Heavy pattern chain link 3 mm
- Extra heavy pattern chain link 3 mm

D. **EXTENSION ARMS**

Extension arms for barbed wire shall be of mild steel to B.S. 1722: Part 1, cranked at 45 degrees and slotted for three strands of barbed wire at centres not exceeding 150 mm.

Arms for concrete, steel and timber intermediate posts shall be of 35 x 6 mm mild steel flat. Arms for concrete and timber straining posts shall be of 50 x 50 x 6 mm mild steel angle. Arms for steel straining posts shall be of similar section to the post.

E. **SUNDRIES**

Galvanised steel eye bolt strainers and winding brackets shall be to B.S.1722.

Bolts, nuts and washers shall be ISO metric to B.S. 4190.

Galvanised wire staples shall be to B.S. 1494: Part 2: - 9 s.w.g. x 32 mm.

Black bitumen coating solution shall be to B.S. 3416: Type 1.

F. **PREPARING POSTS**

Timber posts shall be drilled for line wire at the height specified, notched for struts in the top third of the exposed pole, and coated at the bottom end with bitumen to a height 300 mm above ground level.

Steel posts and struts shall be drilled for connection by two 10 mm diameter bolts at a point in the top third of the exposed post.
Preambles
External Works

EXTERNAL WORKS

A. FIXING POSTS

Straining posts shall be provided at all ends and changes of direction or level and in straight runs at intervals not exceeding 50 metres.

Struts shall be fitted to straining post in the direction of each line of fencing.

Intermediate posts shall be provided at intervals not exceeding 3 metres.

Post and strut holes shall be excavated not less than 450 x 450 mm on plan: 600 mm deep for fences not exceeding 1400 mm high and 750 mm deep for fences exceeding 1400 mm high.

Concrete bases shall be as specified and not less than half the depth of the post holes.

Wires and fencing shall not exert strain until at least seven days after posts are fixed in bases.

B. FIXING LINE WIRES

Lines wires shall be threaded through posts, connected to eye bolt strainers at ends and angles and strained taut to approval.

C. FIXING BARBED WIRE

Barbed wire shall be slotted into steel extension arms, stapled to timber posts or wired firmly to concrete posts as specified and strained taut to approval.

D. FIXING CHAIN LINK

Chain link fencing shall be wired firmly to each line wire at horizontal centres not exceeding 600 mm.
Preambles
External Works

EXTERNAL WORKS

LANDSCAPING

A. GENERAL PLANTING PREPARATION

a) All imported red soil and manure must be free of roots, weeds and debris. Manure is to be dry and well rotted. It must be either horse, cow or chicken manure.
b) Remove all stones, branches and debris, etc. from planting areas.
c) All lawn areas should be 15 mm higher than adjacent shrub beds and paved areas.
d) Where possible, all planted areas must slope gently (1% slope) away from built structures unless specified.
e) Grass seedlings/root cuttings must be free of weeds and any other species of grass.
f) Trees and shrubs must be in a healthy condition and free from pests and diseases, with a well developed root-ball.

B. LAWN INSTALLATION

a) Remove all natural debris and rocks larger than 40 mm in diameter.
b) Cultivate to a depth of 250 mm to break up large lumps of soil. Mix the imported red soil with black cotton soil in 1:1 ratio (where necessary).
c) Add 15 mm of very dry rotted manure to the surface of the soil and cultivate into the soil to a depth of 150 mm. Add 10gm of general fertilizer DAP per square metre and work into the soil.
d) Grade and rake the surface of the soil to a smooth surface.
e) Plant grass seedlings at a depth of 50 mm, exposing only a small amount of leaf, 100 mm apart.
f) Water thoroughly.
g) Water as required and remove weeds as soon as they appear.
EXTERNAL WORKS

A. TREE, SHRUB AND GROUNDCOVER INSTALLATION

a) Excavate a hole not less than 750 mm deep and 900 mm wide for each shrub and 1000 mm deep and 1500 mm wide for each tree. (Where there are several shrubs planted together in a shrub bed, the entire area of the shrub bed is to be excavated). For groundcover, a depth of 300 mm is adequate.

b) Remove soil and prepare a planting mixture as follows:

   - 6 parts good red topsoil
   - 1 part dry well rotted manure
   - 250g general fertilizer (20:20:20) for shrubs and 500g for trees.

c) Water the hole prior to backfilling.

d) Return two-thirds of the soil mixture to the hole and make sure there are no air pockets.

e) Remove plant from container and place in hole so that the soil mark around the stem of the plant is level with the top of the hole.

f) Add rest of the soil mixture, firming gently.

g) Raise the surface around the rim of the original hole to create a saucer for watering.

h) Water the plant thoroughly.

i) Stake the trees on windward side where necessary.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>RATE</th>
<th>AMOUNT</th>
</tr>
</thead>
</table>

**SECTION 02**

**TOILET BLOCK**

**ELEMENT NO. 1**

**DEMOLITIONS (ALL PROVISIONAL)**

All works under this element includes cutting breaking, pulling down of item described and carting away debris. The contractor must include in his rates all costs arising therefrom and making good damages to the satisfaction of the Architect.

**A**

Allow for demolition of existing prefabricated structure and dispose arising debris. Any salvage material to be handed over to the client.

Sum

Element 01

Demolitions - Carried to Summary

KShs.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>RATE</th>
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<tbody>
<tr>
<td>ELEMENT NO. 2</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>SUBSTRUCTURE WORKS - ALL PROVISIONAL</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Excavation including maintaining and supporting sides and keeping free from water, mud and fallen materials</td>
<td></td>
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<tr>
<td>Site Clearance</td>
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<tr>
<td>A</td>
<td>Excavate to remove top soil and load and cart away, average depth 200mm</td>
<td>SM</td>
<td>0</td>
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<tr>
<td></td>
<td>Bulk excavations</td>
<td></td>
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</tr>
<tr>
<td>B</td>
<td>Mass excavation to reduce levels n.e 1.5m deep</td>
<td>CM</td>
<td>32</td>
<td></td>
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<tr>
<td>For foundations</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>C</td>
<td>Not exceeding 1.50 metres deep from reduced level</td>
<td>CM</td>
<td>34</td>
<td></td>
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</tr>
<tr>
<td>D</td>
<td>Extra over for excavating in soft rock</td>
<td>CM</td>
<td>13</td>
<td></td>
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<tr>
<td>Disposal</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>E</td>
<td>Backfilling around foundations</td>
<td>CM</td>
<td>12</td>
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<td></td>
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<tr>
<td>F</td>
<td>Load and cart away surplus spoil</td>
<td>CM</td>
<td>54</td>
<td></td>
<td></td>
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<tr>
<td>Imported Filling</td>
<td></td>
<td></td>
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<tr>
<td>G</td>
<td>250mm thick hardcore filling compacted in layers</td>
<td>SM</td>
<td>69</td>
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<tr>
<td>H</td>
<td>Stone dust blinding to hardcore, e.t.c., thickness 50mm</td>
<td>SM</td>
<td>69</td>
<td></td>
<td></td>
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<tr>
<td>Damp Proof membrane</td>
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<tr>
<td>I</td>
<td>1000 Gauge polythene sheeting laid under surface beds</td>
<td>SM</td>
<td>75</td>
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</tr>
<tr>
<td>Anti-Termite treatment</td>
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<tr>
<td>J</td>
<td>Chemical anti-termite treatment executed by an approved specialist</td>
<td>SM</td>
<td>75</td>
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<tr>
<td>Plain Concrete class 15</td>
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<tr>
<td>K</td>
<td>50mm Blinding under foundations and bases</td>
<td>SM</td>
<td>48</td>
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<tr>
<td>Vibrated Reinforced Concrete Class 20</td>
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<tr>
<td>L</td>
<td>150mm beds</td>
<td>SM</td>
<td>75</td>
<td></td>
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<tr>
<td>M</td>
<td>Strip foundations</td>
<td>CM</td>
<td>10</td>
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<tr>
<td>Reinforcement (All Provisional)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>N</td>
<td>High Yield deformed steel bar reinforcement to B.S 4461</td>
<td>KG</td>
<td>864</td>
<td></td>
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<tr>
<td>Steel mesh fabric reinforcement to B.S 4483</td>
<td></td>
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<tr>
<td>O</td>
<td>Layer of mesh fabric reinforcement laid in slab (measured nett - no allowance for laps) Ref A86 weighing 1.54Kgs per square metre</td>
<td>SM</td>
<td>75</td>
<td></td>
<td></td>
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<tr>
<td>Formwork</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>P</td>
<td>Sides of foundations, bases etc</td>
<td>SM</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load bearing machine dressed stone walling (5.0N/sq.mm minimum crushing strength) in cement motar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>200mm walling</td>
<td>SM</td>
<td>108</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bituminous felt damp proof courses laid on and including leveling screed of cement mortar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>In walling, width - 200mm</td>
<td>LM</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cement and sand (1:4) rendering</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>S</td>
<td>Rendering to plinths finished with a wood float, thickness 15mm</td>
<td>SM</td>
<td>16</td>
<td></td>
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</tr>
<tr>
<td>Prepare and apply two coats bituminous paint</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Rendered plinths</td>
<td>SM</td>
<td>16</td>
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**Element No. 2**  
Substructures - Carried to Summary  
KShs.
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<tbody>
<tr>
<td>ELEMENT NO. 3</td>
<td>R.C SUPERSTRUCTURE Vibrated Reinforced Concrete Class 20</td>
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</tr>
<tr>
<td>A</td>
<td>Ringbeams</td>
<td>CM</td>
<td>5</td>
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<tr>
<td></td>
<td>Reinforcement (All Provisional) High Yield deformed steel bar reinforcement to B.S 4461</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>B</td>
<td>Reinforcement in different sizes</td>
<td>KG</td>
<td>456</td>
<td></td>
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<tr>
<td></td>
<td>Formwork</td>
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<td></td>
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</tr>
<tr>
<td>C</td>
<td>Sides and soffits of Beams</td>
<td>SM</td>
<td>64</td>
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</table>

Element No. 3 R.C Superstructure - Carried to Summary KShs.
## Proposed Toilet Block

<table>
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<tr>
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<tr>
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<td>ELEMENT NO. 4</td>
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<tr>
<td></td>
<td>WALLING</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Precast or insitu concrete 1:2:4 to 20 gauge lintols including moulds or formwork</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>A</td>
<td>Lintol reinforced with two 12mm mild steel bars, size - 200x200mm</td>
<td>LM</td>
<td>23</td>
<td>KShs. CTS.</td>
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</tr>
<tr>
<td></td>
<td>Solid concrete block walling in cement mortar</td>
<td></td>
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<tr>
<td>B</td>
<td>150mm Walling reinforced as described</td>
<td>SM</td>
<td>43</td>
<td>KShs. CTS.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Load bearing machine dressed stone walling in cement mortar</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>C</td>
<td>200mm walling</td>
<td>SM</td>
<td>40</td>
<td>KShs. CTS.</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>200mm walling with fair face and raked horizontal and flush vertical joints one side</td>
<td>SM</td>
<td>64</td>
<td>KShs. CTS.</td>
<td></td>
</tr>
</tbody>
</table>

Element No. 4
Walling | Carried to Summary | KShs. |
<table>
<thead>
<tr>
<th>ITEM</th>
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<th>QUANTITY</th>
<th>RATE</th>
<th>AMOUNT</th>
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<tbody>
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<td></td>
<td></td>
<td></td>
<td>KShs.  CTS.</td>
</tr>
<tr>
<td>A</td>
<td>Mortice in concrete for holding down bolts, and grouting in.</td>
<td>NO</td>
<td>93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Raking cutting on steel sheets</td>
<td>LM</td>
<td>69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Roof Underlays</td>
<td>SM</td>
<td>98</td>
<td></td>
<td></td>
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<tr>
<td>D</td>
<td>Roof sheeting laid with 94 mm side laps and minimum 200 mm end laps fixed to timber purlins with and including roofing screws, washers and caps at centres</td>
<td>NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Purpose made curved ridge, girth</td>
<td>LM</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Sawn cypress treated as described</td>
<td>LM</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>22Gauge pressed steel pipes, gutters and fittings</td>
<td>LM</td>
<td>295</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>22Gauge Galvanized mild steel roofing sheets prepainted to an approved standard colour</td>
<td>NO</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Provide for Supply of gutters and fittings a Provisional Sum of Shillings Zero</td>
<td>Sum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>“FIX ONLY” 22Gauge pressed steel pipes, gutters and fittings</td>
<td>LM</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Box gutter, in approved profile, size 150x200mm</td>
<td>LM</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>Extra for stopped end, size 150x200mm</td>
<td>NO</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>UPVC pipes, gutters and fittings to B.S 4576, part 1 (References to Terrain product handbook PH.05)</td>
<td>LM</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Pipes (2100) with solvent welded joints fixed to walls with adjustable clips, diameter 100mm</td>
<td>LM</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>Extra for off-set diameter, 100mm</td>
<td>NO</td>
<td>0</td>
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</tr>
<tr>
<td>P</td>
<td>Extra for Shoe, diameter 100mm</td>
<td>NO</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>Prepare and apply two coats bituminous paint</td>
<td>SM</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Prepare, prime and apply one undercoat and two coats gloss finishing coat oil paint to metal</td>
<td>SM</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Internal surfaces of the gutter</td>
<td>SM</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>General surfaces</td>
<td>SM</td>
<td>0</td>
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</tbody>
</table>

**Element No. 5**

Roofing & Rainwater Disposal - Carried to Summary

KShs.
<table>
<thead>
<tr>
<th>ITEM</th>
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<th>QUANTITY</th>
<th>RATE</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Rendering to walls finished with a wood float, thickness, 15mm (External)</td>
<td>SM</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Beds to receive flooring, etc., finished with a wood float, thickness - 32mm</td>
<td>SM</td>
<td>66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Backing to tile dados, etc., thickness - 10mm</td>
<td>SM</td>
<td>230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>&quot;Supply and Fix&quot; non slip coloured ceramic floor tiles including bedding in approved adhesive and pointing in tinted cement</td>
<td>SM</td>
<td>66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Ditto, ceramic wall tiles including bedding in approved adhesive and pointing in tinted cement</td>
<td>SM</td>
<td>230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>100x50mm branding, plugged</td>
<td>LM</td>
<td>91</td>
<td></td>
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</tr>
<tr>
<td>G</td>
<td>50x50mm branding</td>
<td>LM</td>
<td>714</td>
<td></td>
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</tr>
<tr>
<td>H</td>
<td>Prepare and apply three coats Duracoat &quot;Duraplast&quot; paint to rendered concrete surfaces externally</td>
<td>SM</td>
<td>16</td>
<td></td>
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<tr>
<td>I</td>
<td>9mm Ceiling, skimmed and sanded smooth</td>
<td>SM</td>
<td>77</td>
<td></td>
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<tr>
<td>J</td>
<td>Provide for Cornices a Provisional Sum of Shillings Forty Five thousand</td>
<td>SUM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Gypsum surfaces</td>
<td>SM</td>
<td>77</td>
<td></td>
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<tr>
<td></td>
<td>Element No. 6 Internal &amp; External Finishes</td>
<td></td>
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<td></td>
<td>KShs.</td>
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<tr>
<td></td>
<td>- Carried to Summary</td>
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January, 2020
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<th>UNIT</th>
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<th>RATE</th>
<th>AMOUNT</th>
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<tbody>
<tr>
<td>A</td>
<td>Window boards with one labour plugged, size 150x20mm</td>
<td>LM</td>
<td>20</td>
<td></td>
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</tr>
<tr>
<td>B</td>
<td>Precast or Insitu concrete cill in approved profile</td>
<td>LM</td>
<td>20</td>
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<tr>
<td>C</td>
<td>Window with two top hung openable lights, fixed lights and comprising ten unequal panes, overall size, 500x1200mm</td>
<td>NO</td>
<td>8</td>
<td></td>
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<tr>
<td>D</td>
<td>Window with two top hung openable lights, fixed lights and comprising ten unequal panes, overall size, 600x1500mm</td>
<td>NO</td>
<td>3</td>
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<tr>
<td>E</td>
<td>Window with two top hung openable lights, fixed lights and comprising ten unequal panes, overall size, 1500x1500mm</td>
<td>NO</td>
<td>1</td>
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<tr>
<td>F</td>
<td>Window with two top hung openable lights, fixed lights and comprising ten unequal panes, overall size, 2000x1500mm</td>
<td>NO</td>
<td>1</td>
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<tr>
<td>G</td>
<td>Window with two top hung openable lights, fixed lights and comprising ten unequal panes, overall size, 2500x1500mm</td>
<td>NO</td>
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<td></td>
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<tr>
<td>H</td>
<td>4mm Glass and glazing to metal with putty in panes - not exceeding 0.10 square meters</td>
<td>SM</td>
<td>17</td>
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<tr>
<td>I</td>
<td>Prepare, prime and apply one undercoat and two matt finishing coats oil paint to metal</td>
<td>SM</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>Windows, doors and Grilles (both sides measured overall)</td>
<td>SM</td>
<td>20</td>
<td></td>
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<tr>
<td>K</td>
<td>Frame, skirting, etc. - 100 to 200mm girth</td>
<td>LM</td>
<td>20</td>
<td></td>
<td></td>
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<tr>
<td>L</td>
<td>Surfaces - 100 to 200mm girth</td>
<td>LM</td>
<td>20</td>
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<td><strong>Element No. 7</strong></td>
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<td><strong>KShs. 7,958,716</strong></td>
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<td>ELEMENT NO. 8</td>
<td></td>
<td></td>
<td></td>
<td>KShs. C.T.s.</td>
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<tr>
<td></td>
<td><strong>DOORS</strong></td>
<td></td>
<td></td>
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<tr>
<td>A</td>
<td>50mm Solid mahogany panel door in six panels and comprising 150x50mm stiles and top rail, 200x50mm transom and bottom rail, overall size, 900x2400mm</td>
<td>NO 3</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>B</td>
<td>Moulded Architraves - size 50x20mm</td>
<td>LM 52</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>C</td>
<td>Quadrant beadings - size 20x10mm</td>
<td>LM 52</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>D</td>
<td>Rebated door frames with two labours plugged, size 150x50mm</td>
<td>LM 52</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>E</td>
<td>Flush doors to B.S. 459 (Part 2)</td>
<td>NO 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>45mm Semi-Solid core flush door faced both sides with 6mm interior quality ply and &quot;Walnut&quot; veneered for spray staining and hardwood lipped all round, size 900x2100mm</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td><strong>Ironmongery</strong></td>
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<tr>
<td>F</td>
<td>Provide for Supply of ironmongery a Provisional sum of Shillings Forty Thousand, Nine Hundred and Fifty</td>
<td>Sum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>&quot;FIX ONLY&quot; with matching screws</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>H</td>
<td>Pairs, 100mm brass butt hinges</td>
<td>NO 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Pairs, 125mm brass butt hinges</td>
<td>NO 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>2 lever Mortice lock with lever furniture</td>
<td>NO 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Indicator Bolt</td>
<td>NO 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Door stops</td>
<td>NO 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prepare and apply one coat wood preservative to woodwork before fixing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>Frames, skirtings e.t.c 100 to 200mm girth</td>
<td>104</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>Ditto, Surfaces, 200 to 300mm girth</td>
<td>LM 52</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Prepare, stain and apply three coats polyurethane varnish to woodwork</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>General surfaces</td>
<td>SM 37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>Ditto, Surfaces, 200 to 300mm girth</td>
<td>LM 52</td>
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Element No. 8

Doors

Carried to Summary

KShs.
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<tbody>
<tr>
<td>ELEMENT NO. 9</td>
<td>JOINERY FITTINGS</td>
<td></td>
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<tr>
<td>A</td>
<td>Allow a su of Shillings One Hundred and Fifty Thousand for Joinery Works</td>
<td></td>
<td></td>
<td>Sum</td>
<td></td>
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<tr>
<td>Element No. 8</td>
<td>Doors</td>
<td>-</td>
<td>Carried to Summary</td>
<td></td>
<td>KShs.</td>
</tr>
</tbody>
</table>
### Electrical Installations

**A. Lighting Points**

Lighting and mirror light point completely wired in 3 x 1.5mm² single core PVC insulated copper cables drawn in 20mm diameter heavy gauge PVC conduits including all accessories for one way switching, but excluding the switch and luminaire.

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>A</td>
<td>10A one gang two way switch as MK</td>
<td>NO 3</td>
<td></td>
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</tr>
</tbody>
</table>

**B. Switches**

10A one gang two way switch as MK

**C. Lighting Fittings**

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>a</td>
<td>12W recessed downlighter light fitting as to approved as Type B</td>
<td>NO 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>b</td>
<td>Security light fitting as to approved as Type P</td>
<td>NO 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>c</td>
<td>Mirror light fitting as to approved as Type M</td>
<td>NO 6</td>
<td></td>
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</table>

**D. Power Submains**

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
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<th>Unit</th>
<th>Quantity</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>a</td>
<td>6-WAY consumer unit as SPS or as to approved</td>
<td>NO 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>b</td>
<td>MCCB’s for item 1.04 above</td>
<td>NO 3</td>
<td></td>
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</tr>
<tr>
<td>25</td>
<td>c</td>
<td>3x6.0mm copper cables to the consumer unit from the nearest power supply board (approximate 25 metres away subject to measurements at site)</td>
<td>LM 25</td>
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**Element No. 10**

Electrical Installations - Carried to Summary

**KShs.**
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<th>UNIT</th>
<th>QUANTITY</th>
<th>RATE</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Water closet pan, floor mounted, back to wall with seat &amp; cover</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Concealed flush valve, 11/4&quot;, Vado</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Wash hand basin, countertop, push/metering tap &amp; accessories</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Urinal bowl, bracket, accessories, 3/4&quot; push flush valve</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Urinal divider</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Soap dispenser</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Hand drier</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Toilet roll holder</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Mirror 1800x900mm</td>
<td>2</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>J</td>
<td>Angle valve &amp; flexible connector</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Cleaners sink, acrylic with tap</td>
<td>1</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>M</td>
<td>PPR PN 20 Pipes</td>
<td>18</td>
<td></td>
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<tr>
<td>N</td>
<td>25mm diameter</td>
<td>32</td>
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<tr>
<td>O</td>
<td>40mm diameter</td>
<td>38</td>
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<td>P</td>
<td>50mm diameter</td>
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<td>Q</td>
<td>Elbow</td>
<td>14</td>
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<tr>
<td>R</td>
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<tr>
<td>S</td>
<td>40mm diameter</td>
<td>12</td>
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<tr>
<td>T</td>
<td>50mm diameter</td>
<td>8</td>
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<tr>
<td>U</td>
<td>Threaded elbow</td>
<td>14</td>
<td></td>
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<tr>
<td>V</td>
<td>25x1/2&quot; mm Female</td>
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<td>W</td>
<td>Socket</td>
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**Notes:**
- **COLD WATER PIPING**
- **Elbow**
- **Threaded elbow**
- **Socket**

**January, 2020**
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<td>C</td>
<td>40mm diameter</td>
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<td>12</td>
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<td>D</td>
<td>50mm diameter</td>
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<td>4</td>
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<td>J</td>
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<td>K</td>
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<td>L</td>
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<tr>
<td>N</td>
<td>32mm</td>
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<tr>
<td>O</td>
<td>40mm</td>
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<tr>
<td>P</td>
<td>Short thread nipple 15mm</td>
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<td>Long thread nipple 40mm</td>
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<tr>
<td>R</td>
<td>Long thread nipple 25mm</td>
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<td>40mm union</td>
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<tr>
<td>T</td>
<td>20mm union</td>
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<td>2</td>
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<td></td>
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<tr>
<td>U</td>
<td>Water booster pump, 5.4m3/hr @2.5bar duty only, variable speed drive</td>
<td></td>
<td>1</td>
<td></td>
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<tr>
<td>V</td>
<td>Roof water tank, 1000 litre, plastic, ball valve and connections</td>
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<tr>
<td>W</td>
<td>Connection to the existing water supply system, approx. 20m away</td>
<td>Item</td>
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<tr>
<td></td>
<td>SANITARY DRAINAGE</td>
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Element No. 6

Mechanical Installations - Carried to Summary
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# PROPOSED TOILET BLOCK FOR IUCN

## MAIN SUMMARY

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**TOTAL CARRIED TO FORM OF TENDER**

KSHS. _______________________

---

(SIGNATURE OF EMPLOYER)  (SIGNATURE OF CONTRACTOR)

ADDRESS: ______________________

ADDRESS: ______________________

DATE: ______________________

DATE: ______________________