REPUBLIC OF KENYA

PROPOSED CONSTRUCTION OF SEED CENTRES - LOT 2 (LONDIANI REGIONAL-CENTRE)

BILLS OF QUANTITES AND DRAWINGS

TENDER REF NO: KEFRI/ONT/011/2022-2023

SITE LOCATION

POINT	NORTHING (m)	EASTINGS (m)
SC1	344738.9138	788836.5286
SC2	344760.8245	788925.6702
SC3	344828.7326	788900.8828
SC4	344768.1472	788808.59

PARTICULAR PRELIMINARIES

ITEM No	DESCRIPTION	AMOUNT
	BILL NO.1 **PARTICULAR PRELIMINARIES**	
	EMPLOYER	
A	The Employer is **Kenya Forestry Research Institute** The term "Employer" and "Government" wherever used in the contract document shall be synonymous.	
	PROJECT MANAGER	
B	The term "P.M" or "Project Manager" wherever used in these Bills of Quantities shall be deemed to imply the "Engineer" as defined in Condition 1 of the Conditions of Contract or such person or persons as may be duly authorized to represent him on behalf of the Government.	
	ARCHITECT	
C	The term "Architect" shall be deemed to mean "the P.M" as defined above whose address, unless otherwise notified, is the Ministry of Lands, Public Works, Housing and Urban Development : State Department for Public Works, P.O.Box 30743-00100, NAIROBI	
	QUANTITY SURVEYOR	
D	The term "Quantity Surveyor" shall be deemed to mean "the P.M" as defined above whose address, unless otherwise notified, is the Ministry of Lands, Public Works, Housing and Urban Development : State Department for Public Works, P.O.Box 30743-00100, NAIROBI	
	STRUCTURAL ENGINEER	
E	The term "Structural Engineer" shall be deemed to mean "the P.M" as defined above whose address, unless otherwise notified, is the Ministry of Lands, Public Works, Housing and Urban Development : State Department for Public Works, P.O.Box 30743-00100, NAIROBI	
	ELECTRICAL ENGINEER	
F	The term "Electrical Engineer" shall be deemed to mean "the P.M" as defined above whose address, unless otherwise notified, is the Ministry of Lands, Public Works, Housing and Urban Development : State Department for Public Works, P.O.Box 30743-00100, NAIROBI	
	MECHANICAL ENGINEER	
G	The term "Mechanical Engineer" shall be deemed to mean "the P.M" as defined above whose address, unless otherwise notified, is the Ministry of Lands, Public Works, Housing and Urban Development : State Department for Public Works, P.O.Box 30743-00100, NAIROBI	
	Carried to collection	

ITEM No	DESCRIPTION	AMOUNT
A	**INTERIOR DESIGNER** The term "Interior Designer" shall be deemed to mean "the P.M" as defined above whose address, unless otherwise notified, is the Ministry of Lands, Public Works, Housing and Urban Development :State Department for Public Works, P.O.Box 30743-00100, NAIROBI	
B	**SCOPE OF CONTRACT** The works consist of construction upto completion of seed centre plus associated electrical , mechanical installations and civil works	
C	**FLOOR AREAS** Ground Floor = 300 m2 **Total Area = 300 m2** **Note :** The above areas are given as a guide an no warranty is given for their accuracy.	
	Carried to collection	

ITEM No	DESCRIPTION	AMOUNT
A	**URGENCY OF THE WORKS** The Contractor is notified that these "works are urgent" and should be completed within the period stated in these Particular Preliminaries. The Contractor shall allow in his rates for any costs he/ she deems that he/she may incur by having to complete these works within the stipulated contract period.	
B	**LOCATION OF SITE** The site of the proposed works is located at Londiani - Kericho County approximately 230 km from Nairobi Central Business District. The Contractor shall be deemed to have visited the site and satisfied himself as to:- **a)** The nature, position, topography and access of the site **b)** The amount of the rubbish or debris to be cleared away before commencement **c)** The nature, current usage, proximity and size of adjoining property and buildings **d)** The positioning of all temporary structures, plant and materials necessary for the execution of the works. The Contractor shall obtain approval from the relevant Local Authority in adherence to site access and erection of temporary structures and must ensure all matters relating to the requirements of these authorities. No claim will be allowed for travelling or other expenses which may be incurred by the Contractor in visiting the site or preparing the tender for the works. The Contractor is advised that the site is within a compound in use and all measures should be taken to avoid nuisance to the existing users. All occupation health and safety requirements must be met as required by law. This includes prevention/ minimizing noise, dust, fumes, providing access to public facilities as required (lifts, washrooms, staircases). Notices should be given prior to disruption of services. Where necessary the Contractor will provide temporary facilities for use as instructed by the Project Manager.	
C	**MEASUREMENTS** The works are measured in accordance with the Standard Method of Measurement of Building Works 2008 Edition, published by the Architectural Association of Kenya. In the event of any discrepancies arising between the Bills of Quantities and the actual works, the site measurements shall generally take precedence. However, such discrepancies between any contract documents shall immediately be referred to the PROJECT MANAGER	
	Carried to collection	

ITEM No	DESCRIPTION	AMOUNT
	DEMOLITIONS AND ALTERATIONS	
A	The Contractor is to allow for all temporary protection required during the works including ordinary and special dust screens, hoardings, barriers, warning signs, etc. as directed by the Project Manager and as necessary for the adequate propping and protection of existing property, finishes, workmen employed on the site, employer's agents and the public. Any damage or loss incurred due to the insufficiency of such protection must be made good by the Contractor. All protective devices are to be removed on completion of the works and any necessary making good consequent upon this is to be executed to the satisfaction of the Project Manager. The works shall be propped, strutted and supported as necessary before any alteration or demolition work commences. Prices shall include for all cleaning and preparatory work to structure and finishes and for making good to all finishes on completion whether or not specifically described Unless described as set aside for re-use all arising debris and surplus materials shall be carefully removed from building and carted away from site. The Contractor shall be entirely responsible for any breakage or damage which may occur to materials required for re-use during their removal unless it is certified by the Project Manager that such damage or breakage was inevitable as a result of the condition of the item concerned.	
	MATERIALS FROM DEMOLITIONS	
B	Any materials arising from demolitions and not re-used shall become the property of the Ministry of Public Works. The Contractor shall allow in his rates the cost of transporting the demolished materials to where directed by the Project Manager.	
	CLEARING AWAY	
C	The Contractor shall remove all temporary works, rubbish, debris and surplus materials from the site as they accumulate and upon completion of the works, remove and clear away all plant, equipment, rubbish, unused materials and stains and leave in a clean The whole of the works shall be delivered up clean, complete and in perfect condition in every respect to the satisfaction of the Project Manager.	
	CLAIMS / COMPENSATION EVENTS	
D	It shall be a condition of this contract that upon it becoming reasonably apparent to the Contractor that he has incurred losses and / or expenses due to any of the contract conditions, or by any other reason whatsoever, he shall present such a claim or intent to claim notice to the PROJECT MANAGER within the contract period. No claim shall be entertained upon the expiry of the said contract period.	
	Carried to collection	

ITEM No	DESCRIPTION	AMOUNT
	PAYMENTS	
A	Payments shall be in accordance with the Conditions of Contract Agreement. In order to facilitate this, a list of the general component elements for the works is given at the summary page of these specifications and the tenderer is requested to break down his tender sum commensurate to the said elements.	
	PAYMENT FOR MATERIALS ON SITE	
B	All materials for incorporation in the works must be stored on site before payment is effected, unless specifically exempted by the Project Manager. This is to include materials of the Contractor, nominated sub-Contractors and nominated suppliers.	
	PREVENTION OF ACCIDENT, DAMAGE OR LOSS	
C	The Contractor is notified that these works are to be carried out on a restricted site where the client is going on with other normal activities. The Contractor is thus instructed to take reasonable care in the execution of the works as to prevent accident	
	WORKING CONDITIONS	
D	The Contractor shall allow in his rates for any interference that he may encounter in the course of the works for the Client may in some cases ask the Contractor not to proceed with the works until some activities within the site are completed.	
	SIGNBOARD	
E	Allow for providing, erecting, maintaining throughout the course of the Contract and afterwards clearing away a signboard as designed, specified and approved by the Project Manager.	
	LABOUR CAMPS	
F	The Contractor shall not be allowed to house labour on site. Allow for transporting workers to and from the site during the tenure of the contract.	
	PRICING RATES	
G	The tenderer shall include for all costs in executing the whole of the works, including transport, replacing damaged items, fixing, all to comply with the said Conditions of Contract.	
	Carried to collection	

ITEM No	DESCRIPTION	AMOUNT
	SECURITY	
A	The Contractor shall allow for providing adequate security for the works and the workers in the course of execution of this contract. No claim will be entertained from the Contractor for not maintaining adequate security for both the works and workers.	
	PAYMENT FOR MATERIALS ON SITE	
B	All materials for incorporation in the works must be stored on site before payment is effected, unless specifically exempted by the Project Manager. This is to include materials of the Contractor, nominated sub-Contractors and nominated suppliers.	
	EXISTING SERVICES	
C	Prior to the commencement of any work, the Contractor is to ascertain from the relevant authority the exact position, depth and level of all existing services in the area and he/she shall make whatever provisions may be required by the authorities concerned	
	BID SECURITY	
D	The Bidder shall furnish, as part of his bid, a security as specified in the tender advertisement and shall be in the form specified under Section IV-Standard Forms of the Tender Document.	
	PERFORMANCE SECURITY	
E	A bond of 5% of the contract sum will be required in accordance with clause 48.0 of Instruction to Tenderers (Section I of the Tender Document) and Clause 4.2 of the General Conditions of Contract (Section VIII of the Tender Document). Note that no payments on account of works executed will be made to the Contractor until he has submitted the Performance Bond to the Project Manager, duly stamped signed and sealed by an approved bank or insurance company	
	Carried to collection	

ITEM No	DESCRIPTION	AMOUNT
	INSURANCE	
A	The Contractor shall insure as required in Condition No. 18 of the Conditions of Contract. No payment on account of the work executed will be made to the Contractor until he has satisfied the PROJECT MANAGER either by production of an Insurance Policy or Insurance Certificate that the provision of the foregoing Insurance Clauses have been complied with in all respects. Thereafter the PROJECT MANAGER shall from time to time ascertain that premiums are duly paid up by the Contractor who shall, if called upon to do so, produce the receipted premium renewals for the PROJECT MANAGER's inspection.	
	TENDER DOCUMENTS	
B	Tender documents are as listed in Clause 11 of **Section I-Instruction to Tenderers** of the Tender Document.	
	VALUE ADDED TAX	
C	The Contractor's attention is drawn to V.A.T PUBLIC NOTICE NO. 6 of 5th August, 1993 regarding the Finance Bill 1993 which expanded the V.A.T base to cover construction services amongst other items. The Contractor shall familiarize himself with the said notice and allow in all his Bills of Quantities rates for the net tax. (i.e. less input tax where applicable) as required by law. The tenderer is advised that in accordance with Government Public Notice No.35 &36 dated 11th September 2003, operational from 1st October 2003, V.A.T will be deducted against the contract sum at the prevailing rate by the Employer and remitted directly to the Commissioner of V.A.T through all interim certificates. It should however be noted that this is not additional tax but a new mode of payment for V.A.T, any excess payment will be refundable once the Contractor has submitted monthly returns to the Commissioner of V.A.T who will do the refunds when satisfied that the V.A.T regulations have been complied with.	
	Carried to collection	

ITEM No	DESCRIPTION	AMOUNT
	PROJECT MANAGERMENT EXPENSES Disclaimer: The following items are to be expended at the discretion of the Project Manager.	
	Project Management Expenses	
A	N/A	
	Carried to collection	

ITEM No	DESCRIPTION	AMOUNT
	FORM OF CONTRACT	
A	The Form of Contract shall be as stipulated in the Republic of Kenya's Standard Tender Document for Procurement of Building Works (2021 edition) included herein under Section VIII of the Tender Documents	
	CONDITIONS OF CONTRACT	
B	These are numbered from 1 to 20 as set out under Section VIII of this Tender Document If the Contractor considers that compliance with any of the Conditions of Contract involves any expenses, he shall distribute the cost among the rates for the various items in the Bills of Quantities. No claim shall be allowed arising from the Contractor's compliance with any of the Conditions of Contract.	
	PARTICULARS OF INSERTIONS TO BE MADE IN APPENDIX TO CONTRACT AGREEMENT	
C	The following are the insertions to be made in the appendix to the Contract Agreement: -	
	Period of Final Measurement **3** Months From Practical completion	
	Defects Liability Period **6** Months from Practical completion	
	Date for Possession To be agreed with the Project Manager	
	Date for Completion ……34.. Weeks from date of Possession	
	Delay Damages 0.01% of the contract amount per day	
	Period of Interim Certificates Monthly	
	Percentage of Certified Value Retained 10 %	
	Limit of Retention Fund 10 %	
	Carried to collection	

ITEM No	DESCRIPTION	AMOUNT
	COLLECTION Brought forward from page PP/1 Brought forward from page PP/2 Brought forward from page PP/3 Brought forward from page PP/4 Brought forward from page PP/5 Brought forward from page PP/6 Brought forward from page PP/7 Brought forward from page PP/8 Brought forward from page PP/9	
	TOTAL FOR PARTICULAR PRELIMINARIES CARRIED TO PRELIMINARIES SUMMARY	

GENERAL PRELIMINARIES

ITEM No.	DESCRIPTION	AMOUNT
	BILL NO.2 **GENERAL PRELIMINARIES**	
A	**PRICING OF ITEMS OF PRELIMINARIES AND PREAMBLES** Prices will be inserted against items of Preliminaries in the Contractor's priced Bills of Quantities and Specification. The Contractor shall be deemed to have included in his prices or rates for the various items in the Bills of Quantities or Specification for all costs involved in complying with all the requirements for the proper execution of the whole of the works in the Contract.	
B	**ABBREVIATIONS** Throughout these Bills, units of measurement and terms are abbreviated and shall be interpreted as follows:- **C.M.** Shall mean cubic metre **S.M.** Shall mean square metre **L.M.** Shall mean linear metre **MM** Shall mean Millimetre **Kg.** Shall mean Kilogramme **No.** Shall mean Number **Prs.** Shall mean Pairs **B.S.** Shall mean the British Standard Specification Published by theBritish Standards Institution, 2 Park Street, London W.I., England. **Ditto** Shall mean the whole of the preceding description except as qualified in the description in which it occurs. **m.s.** Shall mean measured separately. **a.b.d** Shall mean as before described.	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
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. Rates and prices quoted shall cover all his obligations under the contract and all matters and things necessary for the proper completion and maintenance of the works	
B	**RECORDS** The Contractor shall ensure proper records are kept and maintained for : Daily Reports on Personnel and Machinery; tracked programme; site photographs in digital camera; weather charts/reports; site instruction book and query book. a digital camera shall be provided for taking progress photos	
C	**PLANT, TOOLS AND VEHICLES** Allow for providing all scaffolding, plant, tools and vehicles required for the works except in so far as may be stated otherwise herein and except for such items specifically and only required for the use of nominated Sub-Contractors as described herein. No timber used for scaffolding, formwork or temporary works of any kind shall be used afterwards in the permanent work.	
D	**TRANSPORT.** Allow for transport of workmen, materials, etc., to and from the site at such hours and by such routes as may be permitted by the competent authorities.	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
	MATERIALS AND WORKMANSHIP.	
A	All work is to be carried out in accordance with the Ministry of Works General Specifications for Building Works, 1976 Edition together with any amendments thereto. All materials and workmanship used in the execution of the work shall be of the best quality and description unless otherwise stated. The Contractor shall order all materials to be obtained from overseas immediately after the Contract is signed and shall also order materials to be obtained from local sources as early as necessary to ensure that they are onsite when required for use in the works. The Bills of Quantities shall not be used for the purpose of ordering materials.	
	SIGN FOR MATERIALS SUPPLIED.	
B	The Contractor will be required to sign a receipt for all articles and materials supplied by the CLIENT at the time of taking deliver thereof, as having received them in good order and condition, and will thereafter be responsible for any loss or damage and for replacements of any such loss or damage with articles and/or materials which will be supplied by the CLIENT at the current market prices including Customs Duty and V.A.T., all at the Contractor's own cost and expense, to the satisfaction of the PROJECT MANAGER	
	STORAGE OF MATERIALS	
C	The Contractor shall provide at his own risk and cost where directed on the site weather proof lock-up sheds and make good damaged or disturbed surfaces upon completion to the satisfaction of the PROJECT MANAGER. Nominated Sub-Contractors are to be made liable for the cost of any storage accommodation provided especially for their use.	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
A	**SAMPLES** The Contractor shall furnish at his own cost any samples of materials or workmanship including concrete test cubes required for the works that may be called for by the PROJECT MANAGER for his approval until such samples are approved by the PROJECT MANAGER and the PROJECT MANAGER may reject any materials or workmanship not in his opinion to be up to approved samples. The PROJECT MANAGER shall arrange for the testing of such materials as he may at his discretion deem desirable, but the testing shall be made at the expense of the Contractor and not at the expense of the PROJECT MANAGER. The Contractor shall pay for the testing in accordance with the current scale of testing charges laid down by the Ministry of Public Works. The procedure for submitting samples of materials for testing and the method of marking for identification shall be as laid down by the PROJECT MANAGER. The Contractor shall allow in his tender for such samples and tests except those in connection with nominated sub-contractors' work.	
B	**GOVERNMENT ACTS REGARDING WORK PEOPLE ETC.** Allow for complying with all Government Acts, Orders and Regulations in connection with the employment of Labour and other matters related to the execution of the works. In particular the Contractor's attention is drawn to the provisions of the Factory Act 1950 and his tender must include for all costs arising or resulting from compliance with any Act, Order or Regulation relating to Insurances, pensions and holidays for workpeople or so the safety, health and welfare of the workpeople. The Contractor must make himself fully acquainted with current Acts and Regulations including Police Regulations regarding the movement, housing, security and control of labour, labour camps , passes for transport, etc. It is most important that the Contractor, before tendering, shall obtain from the relevant Authority the fullest information regarding all such regulations and/or restrictions which may affect the information regarding all such regulations and/or restrictions which may affect the organisation of the works, supply and control of labour, etc., and allow accordingly in his tender. No claim in respect of want of knowledge in this connection will be entertained.	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
A	**PUBLIC AND PRIVATE ROADS.** The contractor shall maintain as required throughout the execution of the works and make good any damage to public or private roads arising from or consequent upon the execution of the works to the satisfaction of the local and other competent authority and the Project Manager.	
B	**EXISTING PROPERTY.** The Contractor shall take every precaution to avoid damage to all existing property including roads, cables, drains and other services and he will be held responsible for and shall make good all such damage arising from the execution of this contract at his own expense to the satisfaction of the Project Manager.	
D	**OCUPATIONAL HEALTH AND SAFETY MEASURES** The Project Manager expects the contractor to adhere to strict safety measures. In this regard the contractor should ensure that all his workers, the consultants and his sub-contractors workmen are wearing Personal Protective Equipment (PPE) before commencement of any work where applicable including overalls with the company name clearly printed on the back each with clearly marked Identification Numbers stitched or imprinted on. The Contractor shall allow for providing all watching, lighting, barriers,signs, covering open trenches and protection of the works, including Sub-Contract works, as may be necessary for the safety of the works and for the protection of the public and his own and Sub-Contractors' employees. He shall also ensure provision of first aid staff, access to ambulance services at all worksites and arrangement to access local hospital/dispensary with qualified medical staff. The Project Manager expects full compliance to this regulation and no excuses will be entertained for non-compliance.	
E	**OCUPATIONAL HEALTH AND SAFETY PERSONEL** The contractor shall allow for Occupational Health and Safety personnel as directed and afford every reasonable facility for the performance of their duties.	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
A	**ACCESS TO SITE AND TEMPORARY ROADS.** Means of access to the Site shall be agreed with the CLIENT prior to commencement of the work and Contractor must allow for building any necessary temporary access roads for the transport of the materials, plant and workmen as may be required for the complete execution of the works including the provision of temporary culverts, crossings, bridges, or any other means of gaining access to the Site. Upon completion of the works, the Contractor shall remove such temporary access roads; temporary culverts, bridges, etc., and make good and reinstate all works and surfaces disturbed to the satisfaction of the PROJECT MANAGER	
B	**AREA TO BE OCCUPIED BY THE CONTRACTOR** The area of the site which may be occupied by the Contractor for use of storage and for the purpose of erecting workshops, etc., shall be defined on site by the PROJECT MANAGER	
C	**OFFICE FOR THE PROJECT MANAGER** The contractor shall , if so instructed, supply, maintain, service, clean and light a fully furnished, suitable office, having an approximate floor area of not less than 50 sqm for exclusive use of the project. The office shall have a sample room, a toilet and bathroom, kitchen of suitable dimensions with clean running water and electricity connected to the approval of the Project Manager. The Contractor shall provide, erect and maintain a lock-up type water or bucket closet for the sole use of the PROJECT MANAGER including making temporary connections to the drain where applicable to the satisfaction of Government and Medical Officer of Health and shall provide services of cleaner and pay all conservancy charges and keep both office and closet in a clean and sanitary condition from commencement to the completion of the works and dismantle and make good disturbed surfaces. The office and closet shall be completed before the Contractor is permitted to commence the works. The Contractor shall make available on the Site as and when required by the "PROJECT MANAGER" a modern and accurate level together with levelling staff, ranging rods and 50 metre metallic or linen tape. On completion of the contract, the contents of the office specified above shall revert to the Client. The contractor shall be responsible throughout the contract period for provision of insurance cover, maintenance of the office equipment and furniture, providing all necesary staff and providing security and garbage disposal facilities	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
A	**LIGHTING AND POWER** The contractor shall provide at his own risk and cost all temporary 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.	
B	**WATER RESOURCES AND USEAGE** The Contractor shall provide at his own risk and cost all necessary water required for use in the works. The Contractor must make his own arrangements for connection to the nearest suitable water main and for metering the water used. He must also provide temporary tanks and meters as required at his own cost and clear away when no longer required and make good on completion to the entire satisfaction of the PROJECT MANAGER . The Contractor shall pay all charges in connection herewith. No guarantee is given or implied that sufficient water will be available from mains and the Contractor must make his own arrangements for augmenting this supply at his own cost. The contractor is to provide clean drinking water at the construction site for his workers at all times. All water shall be fresh, clean and pure, free from earthly vegetable or organic matter, acid or alkaline substance in solution or suspension.	
C	**SANITATION OF THE WORKS** The Sanitation of the works shall be arranged and maintained by the Contractor to the satisfaction of the Government and/or Local Authorities, Labour Department and the PROJECT MANAGER He may however be allowed use of the existing sanitation facilities but shall be responsible for the proper hygienic maintenace and any damage whatsoever. No guarantees are however given regarding the adequacy of the existing services The Contractor will be required to pay all conservancy charges and shall ensure clean daily maintenance and disinfecting of the latrines, and not less than once per week, the whole area shall be sprayed with disinfectant and insecticides and any temporary drains shall be removed and all works and surfaces disturbed made good and then the whole area disinfected and left clean and free from pollution to the satisfaction of the Architect and local authorities.	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
	SUPERVISION AND WORKING HOURS	
A	The works shall be executed under the direction and to the entire satisfaction in all respects of the PROJECT MANAGER who shall at all times during normal working hours have access to the works and to the yards and workshops of the Contractor and sub-Contractors or other places where work is being prepared for the contract.	
	PROVISIONAL SUMS.	
B	The term "Provisional Sum" wherever used in these Bills of Quantities shall have the meaning stated in Section A item A7(i) of the Standard Method of Measurement.Such sums are net and no addition shall be made to them for profit.	
	PRIME COST (OR P.C.) SUMS.	
C	The term "Prime Cost Sum" or "P.C. Sum" wherever used in these Bills of Quantities shall have the meaning stated in Section A item A7 (ii) of the Standard Method of Measurement . Persons or firms nominated by the Project Manager to execute work or to provide and fix materials or goods are described herein as Nominated Sub-Contractors.Persons or firms so nominated to supply goods or materials are described herein as Nominated Suppliers.	
	PROGRESS CHART.	
D	The Contractor shall provide within two weeks of Possession of Site and in agreement with the PROJECT MANAGER a Progress Chart for the whole of the works including the works of Nominated Sub-Contractors ; one copy to be handed to the PROJECT MANAGER and a further copy to be retained on Site. Progress to be recorded and chart to be amended as necessary as the work proceeds.	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
A	**ADJUSTMENT OF P.C. SUMS.** In the final account all P.C. Sums shall be deducted and the amount properly expended upon the PROJECT MANAGER'S order in respect of each of them added to the Contract sum. The Contractor shall produce to the PROJECT MANAGER such quotations, invoices or bills, properly receipted, as may be necessary to show the actual details of the sums paid by the Contractor. Items of profit upon P.C. Sums shall be adjusted in the final account pro-rata to the amount paid. Items of "attendance" (as previously described) following P.C. Sums shall be adjusted pro-rata to the physical extent of the work executed (not pro-rata to the amount paid) and this shall apply even though the Contractor's priced Bill shows a percentage in the rate column in respect of them. Should the Contractor be permitted to tender and his tender be accepted of any work for which a P.C. Sum is included in these Bill of Quantities profit and attendance will be allowed at the same rate as it would be if the work were executed by a Nominated Sub-Contractor.	
B	**ADJUSTMENT OF PROVISIONAL SUMS.** In the final account all Provisional Sums shall be deducted and the value of the work properly executed in respect of them upon the PROJECT MANAGER's order added to the Contract Sum. Such work shall be valued , but should any part of the work be executed by a Nominated Sub-Contractor or the value of such work or articles for the work to be supplied by a Nominated Supplier, the value of such work or articles shall be treated as a P.C. Sum and profit and attendance comparable to that contained in the priced Bills of Quantities for similar items added.	
C	**NOMINATED SUB-CONTRACTORS** When any work is ordered by the PROJECT MANAGER to be executed by nominated sub-contractors, the Contractor shall enter into sub-contracts and shall thereafter be responsible for such sub-contractors in every respect. Unless otherwise described the Contractor is to provide for such Sub-Contractors any or all of the facilities described in these Preliminaries. The Contractor should price for these with the nominated Sub-contract Contractor's work concerned in the P.C. Sums under the description "add for Attendance".	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
A	**DIRECT CONTRACTS** Notwithstanding the foregoing conditions, the Government reserves the right to place a "Direct Contract" for any goods or services required in the works which are covered by a P.C. Sum in the Bills of Quantities and to pay for the same direct. In any such instances, profit relative to the P.C. Sum in the priced Bills of Quantities will be adjusted as described for P.C. Sums and allowed.	
B	**ATTENDANCE UPON OTHER TRADESMEN, ETC.** The Contractor shall allow for the attendance of trade upon trade and shall afford any tradesmen or other persons employed for the execution of any work not included in this Contract every facility for carrying out their work and also for use of his ordinary scaffolding. The Contractor, however, shall not be required to erect any special scaffolding for them. The Contractor shall perform such cutting away for and making good after the work of such tradesmen or persons as may be ordered by the PROJECT MANAGER and the work will be measured and paid for to the extent executed at rates provided in these Bills.	
C	**PROVISIONAL WORK** All work described as "Provisional" in these Bills of Quantities is subject to remeasurement in order to ascertain the actual quantity executed for which payment will be made. 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 PROJECT MANAGER. Immediately the work is ready for measuring, the Contractor shall give notice to the PROJECT MANAGER. If the Contractor makes default in these respects he shall, if the PROJECT MANAGER so directs, uncover the work to enable all measurements to be taken and afterwards reinstate at his own expense.	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
A	**ALTERATIONS TO BILLS, PRICING, ETC.** Any unauthorised alteration or qualification made to the text of the Bills of Quantities may cause the Tender to be disqualified and will in any case be ignored. The Contractor shall be deemed to have made allowance in his prices generally to cover any items against which no price has been inserted in the priced Bills of Quantities.All items of measured work shall be priced in detail and the Tenders containing Lump Sums to cover trades or groups of work must be broken down to show the price of each item before they will be accepted.	
B	**BLASTING OPERATIONS** Blasting will only be allowed with the express permission of the PROJECT MANAGER in writing. All blasting operations shall be carried out at the Contractor's sole risk and cost in accordance with any Government regulations in force for the time being, and any special regulations laid down by the PROJECT MANAGER governing the use and storage of explosives.	
C	**MATERIALS ARISING FROM EXCAVATIONS** Materials of any kind obtained from the excavations shall be the property of the Client. Unless the PROJECT MANAGER directs otherwise such materials shall be dealt with as provided in the Contract. Such materials shall only be used in the works, in substitution of materials which the Contractor would otherwise have had to supply with the written permission of the PROJECT MANAGER. Should such permission be given, the Contractor shall make due allowance for the value of the materials so used at a price to be agreed.	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
A	**PROTECTION OF THE WORKS.** Provide protection of the whole of the works contained in the Bills of Quantities,including casing , casing up, covering or such other means as may be necessary to avoid damage to the satisfaction of the PROJECT MANAGER and remove such protection when no longer required and make good any damage which may nevertheless have been done at completion free of cost to the Client.	
B	**WORKS TO BE DELIVERED UP CLEAN** Clean and flush all gutters, rainwater and waste pipes, manholes and drains, wash (except where such treatment might cause damage) and clean all floors, sanitary fittings,glass inside and outside and any other parts of the works and remove all marks,blemishes, stains and defects from joinery, fittings and decorated surfaces generally,polish door furniture and bright parts of metalwork and leave the whole of the buildings watertight, clean, perfect and fit for occupation to the approval of the PROJECT MANAGER	
C	**GENERAL SPECIFICATION.** For the full description of materials and workmanship, method of execution of the work and notes for pricing, the Contractor is referred to the Ministry of Roads and Public Works and Housing General Specification dated 1976 or any subsequent revision thereof which is issued as a separate document, and which shall be allowed in all respects unless it conflicts with the General Preliminaries, Trade Preambles or other items in these Bills of Quantities.	
	Carried to collection	

ITEM No.	DESCRIPTION	AMOUNT
A	**TRAINING LEVY** The Contractor's attention is drawn to legal notice No. 237 of October, 1971, which requires payment by the Contractor of a Training Levy at the rate of 1/4 % of the Contract sum on all contracts of more than Kshs. 50,000.00 in value.	
B	**MATERIALS ON SITE** All materials for incorporation in the works must be stored on or adjacent to the site before payment is effected unless specifically exempted by the PROJECT MANAGER. This includes the materials of the Main Contractor, Nominated Sub-Contractors and Nominated Suppliers.	
C	**HOARDING** The Contractor shall erect hoarding comprising timber framework and 30 gauge GCI sheets or equal and approved material to Project Manager's approval. The Contractor is to obtain any necessary permits, maintain in position, pay all necessary fees and finally clear away all hoarding on completion. The Contractor is in addition required to take all precautions necessary for the safe custody of the works,materials, plant, public and Employer's property on the site.	
D	**CONTRACTOR'S SUPERINTENDENCE/SITE AGENT** 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 experience in the kind of work involved and shall give his whole time to the superintendence of the works. Such Agent or Representative shall receive on behalf of the Contractor all directions and instructions from the Project Manager and such directions shall be deemed to have been given to the Contractor in accordance with the Conditions of Contract.	
	Carried to Collection	

ITEM No.	DESCRIPTION	AMOUNT
	COLLECTION Brought Forward From Page GP/1 Brought Forward From Page GP/2 Brought Forward From Page GP/3 Brought Forward From Page GP/4 Brought Forward From Page GP/5 Brought Forward From Page GP/6 Brought Forward From Page GP/7 Brought Forward From Page GP/8 Brought Forward From Page GP/9 Brought Forward From Page GP/10 Brought Forward From Page GP/11 Brought Forward From Page GP/12 Brought Forward From Page GP/13	
	TOTAL FOR GENERAL PRELIMINARIES CARRIED TO PRELIMINARIES SUMMARY	

BUILDERS WORKS

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
A	**BUILDERS WORKS** **ELEMENT NO. 1** **DEMOLITIONS AND ALTERATIONS** **DEMOLITIONS** **Existing Building** Carefully demolish existing permanent building, including ground slab, substructure walling, concrete footing, hardcore, masonry wall, timber doors, windows, timber trusses and clay roof tiles and cart away (approximately 90 SM)		*Item*		
	TOTAL FOR DEMOLITIONS AND ALTERATIONS CARRIED TO SUMMARY				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	ELEMENT NO. 2				
	SUBSTRUCTURES (All Provisional)				
A	Clear area of new construction of all undergrowth, small bushes, grab up all trees and remove any existing structures and obstructions as directed.	400	Sm		
B	Cut down trees girth 1200mm- 1500mm, remove out tree stumps and grab out roots, despose off as directed and refill pits	5	No.		
C	Cut down trees girth 2400mm- 2700mm, remove out tree stumps and grab out roots, despose off as directed and refill pits	10	No.		
D	Mass excavation to reduce levels commencing from stripped level: not exceeding 1.5 m deep	413	Cm		
E	Excavate for strip foundation trenches commencing from reduced level: not exceeding 1.5m deep	162	Cm		
F	Ditto for column bases	89	Cm		
G	Excavating in any class of rock as described in the specifications	45	Cm		
H	Return, fill and ram selected soil in foundations	58	Cm		
I	Remove surplus soil and debris from site to a place approved by local authority	662	Cm		
J	Allow for upholding and supporting sides of excavations including any necessary plunking and strutting		Item		
K	Allow for keep excavations free of spring, underground or running water including any necessary pumping, bailing or other approved means		Item		
	Carried to Collection				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	SUBSTRUCTURES CONTINUED				
	Mass concrete mix (1:3:6):in				
A	50 mm Thick blinding under strip foundations	108	Sm		
B	Ditto under column bases	59	Sm		
	Vibrated reinforced insitu concrete class 20/20; with minimum cube crushing strength of 20N/mm² at 28 days; in				
C	Strip foundations	22	Cm		
D	Column bases	21	Cm		
E	Columns	2	Cm		
F	Ground floor slab; 150 mm thick	275	Sm		
G	Ramps; Ditto	4	Sm		
H	Steps	3	Cm		
I	Ground Beam	22	Cm		
	Mesh fabric reinforcement				
J	Mesh reinforcement No. A142 size 200 x 200 mm weighing 2.22 kg per square metre: in floor slab: including all necessary supports	275	Sm		
	Supply and fix mild steel bar in structural concrete work including cutting, bending, hoisting, tying wire, spacing blocks and supporting all in position in foundation footing, column bases and columns				
K	Assorted Bars	8400	Kg		
	Carried to Collection				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	SUBSTRUCTURES CONTINUED				
	Sawn formwork: to				
A	Vertical sides of column bases	59	Sm		
B	Sides of columns	24	Sm		
C	Ditto but curved	10	Sm		
D	Sides of strip footing	72	Sm		
E	Edges of steps;	2	Sm		
F	Ditto but 150 mm riser	36	Lm		
G	Edges of slabs; 75 - 150 mm girth	99	Lm		
H	Sides and soffites of ground beams	198	Sm		
	Walls				
I	Medium Chisel dressed natural stone walling bedded in cement and sand mortar (1:4) with minimum stone crushing strength of 14N/mm²; foundations	591	Sm		
	Hardcore				
J	300 mm thick hardcore of approved inert material: well watered and compacted in 150 mm thick (maximum) layers	222	Sm		
	Blinding				
K	50 mm Thick approved quality murram blinding to surfaces of hardcore	222	Sm		
	Filling				
L	Approved Imported murram fill, well compacted in 150 mm layers to make up levels	496	Cm		
	Carried to Collection				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	SUBSTRUCTURES CONTINUED				
	Anti-termite treatment				
A	Termidor 25EC or other approved anti-termite chemical treatment to surfaces of blinded hardcore and around foundations : applied by approved professional pest control specialist: applied strictly in accordance with the manufacturer's instructions: 10 year guarantee	275	Sm		
	DPM				
B	Gauge 1000 polythene damp proof membrane	275	Sm		
	25 mm Thick cement and sand (1:4) rendering: on concrete or stonework: wood float: to				
C	Plinths: externally	60	Sm		
	Prepare surfaces and apply undercoat and two finishing coats black bitumastic or other equal approved water resistant paint: on rendered surfaces: to				
D	Plinths: externally	60	Sm		
	Planter				
E	Planter walling 200 mm wide approx 5 metres long X 2 metres high with waterproofing plaster to walls and strip footing 600 x 200 mm thick including all necessary reinforcement	2	Sm		
	Carried to Collection				
	COLLECTION				
	From page Bw/2				
	From page Bw/3				
	From page Bw/4				
	From page Above				
	Substructures carried to summary page				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	ELEMENT NO. 3				
	REINFORCED CONCRETE FRAME				
	Sawn formwork: to				
A	Sides and soffits: beams	251	Sm		
B	Columns; vertical sides	42	Sm		
C	Ditto but curved	17	Sm		
	Supply and fix mild steel bar in structural concrete work including cutting, bending, hoisting, tying wire, spacing blocks and supporting all in position				
D	Assorted Bars	3000	Kg		
	Vibrated reinforced insitu concrete class 20/20; with minimum cube crushing strength of 20N/mm² at 28 days; in				
E	Beams	21	Cm		
F	Columns	4	Cm		
	Reinforced Concrete Frame carried to summary page				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	ELEMENT NO. 4				
	WALLS				
	Precast concrete class 20(12mm aggregate) including forwork , finishing fair face on all xposed surfaces,and bedding and jointing in cement sand (1:3) mortar				
A	Pair of permanent ventilation size 225 x 225 x 25mm thick fixed with and including mosquito wire gauze	40	No		
B	300 x 200mm lintol, reinforced with and including four 12mm diameter mild steel rods and 6mm stirrups at 200mm centers	40	Lm		
	External walls				
	Dressed natural quarry stone walling bedded in cement and sand mortar (1:3) with minimum stone crushing strength of 7N/mm²				
C	200 mm Thick walls	323	Sm		
D	Ditto but Gable walls	81	Sm		
	Internal				
	Natural stone walls: machine cut: bedded and jointed in cement and sand (1:3) mortar				
E	200 mm Thick walls	189	Sm		
F	150 mm Thick walls	44	Sm		
	Bituminous felt or other equal approved damp-proof course: in cement/ sand (1:3) mortar				
G	200 mm Wide	185	Lm		
H	150 mm Wide	16	Lm		
	Precast concrete louvered blocks jointed and bedded in cement sand (1:4); including copper wire tray fixed on to the wall block; to approved pattern and colour				
I	200mm Thick walls	6	Sm		
	Walls carried to summary page				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	ELEMENT NO. 5				
	ROOF				
	Roof cover				
	28 Gauge Versatile roof sheets 1020mm overall width 925 mm effective cover width fixed with rubber washers to match, all in strict accordance with the manufacturer`s fixing instructions:-				
A	Roofing not exceeding 22.5 degrees from horizontal	373	Sm		
B	Ditto 450mm wide ridge cap	51	Lm		
C	Ditto 450mm wide hip cap	8	Lm		
D	Ditto valley gutter	35	Lm		
E	Raking and cutting roof cover at hips and valleys	86	Lm		
	Assorted trusses spanning 9 metres and 3 metres above ground. All in sawn celcured and well seasoned cypress:-				
F	150 x 50mm Ceiling Joist	280	Lm		
G	150 x 50mm Rafters	350	Lm		
H	100 x 50mm struts and ties	490	Lm		
I	150 x 50mm King Post	140	Lm		
	The following in nailed celcured sawn first grade cypress roof structures including cleats, hoisting and fixing in position approximately 3 Metres above existing ground level				
J	150 x 50mm wall plate.	201	Lm		
K	75 x 50mm purlins(at 450mm centres)	1625	Lm		
L	200 x 25mm wrott fascia and vergeboard	102	Lm		
M	Knot, prime, stop and apply 3 coats super gloss oil paint to surfaces of fascia and vergeboard 200-300mm high.	102	Lm		
	Carried to Collection				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	ROOF CONTINUED				
	Rain water goods				
	Supply and fix uPVC rainwater system with screwed and socketed joints; solvent welded joints shall be as per the system manufacturer's written instructions; with and including all the couplings, connectors joints,stop ends etc.as required in the running lengths of pipework and also where necessary for pipe fixing clips, holderbats,plugs and screwed				
A	150mm half diameter u.P.V.C gutters fixed to fascia board	102	Lm		
B	75mm diameter p.v.c downpipe to match, clipped to walls	18	Lm		
C	Extra over for swannecks	6	No.		
D	Extra over for 600mm shoe	6	No.		
	Bat Proofing				
E	Bat proofing using foam glue or other equal or approved	102	Lm		
	Carried to Collection				
	COLLECTION				
	From page Bw/8				
	From page Above				
	Roof carried to summary page				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	ELEMENT NO. 6				
	DOORS				
	Timber Doors				
	45 mm thick flush door: solid core; Mahogany veneered to both sides; hardwood lipped edges; refer to Architect's details				
A	Single leaf door; overall size 900 x 2400 mm high; with 6 mm thick clear fanlight glazing overall size 860 x 300 mm high complete with all beadings	6	No		
B	Ditto but 900 x 2100 mm high	5	No		
C	Ditto but 1200 x 2400 mm high	2	No		
D	Ditto but 1000 x 2100 mm high; for PWD complete with all accessories and ironmongery	1	No		
	Supply, assemble and fix the following purpose made welded steel casement doors; gauge 16 metal sheets, with the necessary Union door lock,iron mongery, handles, lever,or finger pulls,pins,building lugs to jamps and reveals,bedding frames in waterproof cement mortar, priming with one coat of red oxide primer,and all necessary coupling mullions,transomes,clear glazed fanlight over and jointing in approved mastic externally and afterwards easing,oiling and adjusting opening lights on completion				
E	900 x 2400mm high	2	No		
F	1500 x 2400mm high	4	No		
	Grill door				
G	1500 mm wide X 2400 mm high overall size single leaf mild steel grill door	3	No		
	Carried to Collection				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	DOORS CONTINUED				
	Roller shutter door				
A	Supply and fix gauge 12, overall size 2600mm x 2700mm galvanized roller shutter door complete with barrel, springs, hanger rings, end plates, canopy, vertical guide rails, curtain; 80mm slats, T bar or bottom rail	4	No		
	FRAMES				
	Wrot mahongany: prime grade; with stainless steel fixing straps; including chasing to masonry, plugging and making good				
B	200 x 50 mm Door frame: twice rebated: plugged	76	Lm		
C	50 x 25 mm Architrave: splayed	76	Lm		
D	25 x 25 mm Quadrant	76	Lm		
	PAINTING & DECORATING				
	Prepare surfaces and apply three coats of approved gloss oil paint to metal surfaces				
E	Doors: both sides measured	60	Sm		
	Prepare and apply one coat of aluminium wood primer on timber surfaces in contact with concrete or masonry				
F	Not exceeding 100 mm girth	152	Lm		
G	Over 100 but not exceeding 200 mm girth	76	Lm		
	Prepare surfaces: apply two coats clear pinotex spirit in clear matt varnish: on timber surfaces: to				
H	Over 200 but not exceeding 300 mm girth	76	Lm		
I	Not exceeding 100 mm girth	152	Lm		
J	General timber surfaces: doors	57	Sm		
	Carried to Collection				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	DOORS CONTINUED				
	IRONMONGERY				
	Supply and fix: 'UNION' or other equal approved ironmongery: matching screws: locks to include a set of 3 keys: available from their authorised local dealers; brass finish to architects approval				
A	100mm brass butt hinges	22.5	Prs		
B	Two lever mortice lock with handles	13	No		
C	Door closer	13	No		
D	38 mm Diameter oval rubber stop; floor or wall mounted	13	No		
	Carried to Collection				
	COLLECTION				
	From page Bw/10				
	From page Bw/11				
	From page Above				
	Door carried to summary page				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	ELEMENT NO. 7				
	WINDOWS				
	Approved pre-cast concrete cill: bedded and jointed in cement (sand (1:3) mortar: pointed in matching coloured cement				
A	250 x 50 mm Thick cill; once weathered and throated	25	Lm		
	Supply and fix the following purpose made steel casement purpose made windows, including all necessary cuttings lugs, stays and bedding into walls in cement sand mortar 1:4 complete with stays, fasteners, with mesh vents, all necessary accessories and priming once in red-oxide, to Architects approval, with minimal burgalr proofing in 20mm angle line framing				
B	Window size 2000 x 1500mm high	5	No.		
C	Window size 3200 x 1500mm high.	4	No.		
D	Window size 1000 x 1500mm high.	2	No.		
E	Ditto size 2000 x 600mm high.	2	No.		
F	Ditto size 3000 x 600mm high.	1	No.		
	GLAZING				
	4mm Clear sheet glass infill				
G	Not exceeding 0.1 Sm	38	Sm		
	4mm Thick obscure sheet glass infill				
H	In panes not exceeding 0.1 square metres;	5	Sm		
	Carried to Collection				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	WINDOWS CONTINUED				
	PAINTING & DECORATING				
	Prepare, prime and apply 3 coats of super gloss oil paint as "crown" or any other equal and approved to surfaces of:				
A	Windows externally	43	Sm		
B	Windows internally	43	Sm		
	Curtain rods				
C	Supply and fix double curtain rod for both vertical blinders and sheers with a strong chrome pipe of 28mm diameter with all necessary accessories	6	Lm		
	Carried to Collection				
	COLLECTION From page Bw/13 From page Above				
	Window carried to summary page				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	ELEMENT NO. 8				
	FINISHES				
	FLOOR FINISHES				
	Cement-sand (1:3) screed to hacked floors:				
A	32mm Thick cement/sand (1:4) screed finished to receive terrazzo (measured separately)	255	Sm		
B	32mm Thick cement/sand (1:4) screed finished to receive ceramic tiles (measured separately)	20	Sm		
	Terrazzo to Floor				
C	20mm thick polished terrazzo paving to floor including plastic dividing strips	255	Sm		
D	100 mm skirting to match	287	Lm		
	Ceramic Floor tiles				
	8 mm thick Italian ceramic floor tiles size 300 x 300mm including grouting to screeded floor beds (m.s)				
E	Floors: Open plan Office area	20	Sm		
F	100 mm skirting to match	17	Lm		
	WALL FINISHES				
	Walls internally				
G	12mm thick gauged plaster cement sand lime 1:1:6 with a smooth float to walls, beams and columns internally	891	Sm		
H	Ditto to reveals and jambs.	30	Sm		
	PAINTING & DECORATIONS				
	Prepare and apply 3 coats silk vinyle emulsion paint as "crown"or any other equal and approved paint to				
I	Plastered walls internally	921	Sm		
	Ceramic Wall tiles				
J	Cement-sand (1:3) backing to walls; finished to receive ceramic wall tiles (m.s)	60	Sm		
	Carried to Collection				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	FINISHES CONTINUED				
	6mm thick Italian ceramic wall tiles size 300 x 300 mm including grouting and plastic edging to wall backing (m.s)				
A	Walls; emergency shower area and washrooms	60	Sm		
	Walls Externally				
B	12mm thick gauged cement sand render 1:2 finished with a wood float to beams and columns	250	Sm		
C	Keying in cement sand 1:2, pointing in gloss oil paint and wire brushing natural machine cut stone externally	154	Sm		
	PAINTING & DECORATIONS				
	Prepare and apply 3 coats silk vinyle emulsion paint as "crown"or any other equal and approved paint to				
D	Plastered walls externally	250	Sm		
	CEILING FINISHES				
	Gypsum board to BS 1230				
E	12 mm gypsum board ceilings fixed with and including steel channels and hangers, all in accordance with architect's details and manufacturers printed instructions (Area measured nett)	275	Sm		
E	100 mm wide x 8mm thick moulded cornices to match ceiling	304	Lm		
	Prepare and apply three coats first quality silk vinyl paint to				
F	Gypsum board suspended ceiling soffits	275	Sm		
G	Cornice surfaces	304	Lm		
H	Extra-over ditto in access door size 450 x 600mm, including steel framing	4	No.		
	PVC				
I	Upvc ceiling panels including 50 x 50 mm at 450 mm centres sawn cypress brandering, lipping and matching cornice	122	Sm		
	Carried to Collection				
	COLLECTION				
	From page Bw/15				
	From page Above				
	TOTAL FOR FINISHES CARRIED TO SUMMARY				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	ELEMENT NO. 9				
	JOINERY FITTINGS				
A	Low level cabinets for the Laboratory (approx. size 6000 x 600 x 900 mm high); Complete with concrete top with terrazzo finish, masonry side walls plastered and painted, Laminated waterproof blockboard doors complete with all necessary ironmongery and accessories; allow for leaving 4 no. opening to receive lab sink (m/s) size (552 x 400 mm)	1	No		
B	Washroom worktops (approx. size 1200 x 600 x 100 mm thick); Complete with concrete top with terrazzo finish and allow for leaving opening to receive sink (m/s) size (600 x 460 mm)	2	No		
C	Laminated waterproof blockboard open shelves (approx. size 300 mm wide x 2700 mm high); Complete with steel wall brackets and all necessary accessories	30	Lm		
	Joinery Fittings carried to summary page				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	SUMMARY OF ELEMENTS				
A	ELEMENT NO. 1 ,DEMOLITION AND ALTERATIONS				
B	ELEMENT NO. 2 , SUBSTRUCTURE				
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D	ELEMENT NO 4, WALLING				
E	ELEMENT NO. 5, ROOF				
F	ELEMENT NO. 6 , DOORS				
G	ELEMENT NO. 7 , WINDOWS				
H	ELEMENT NO. 8 , FINISHES				
I	ELEMENT NO. 9 , JOINERY FITTINGS				
	TOTAL FOR BUILDERS WORK CARRIED TO GRAND SUMMARY.				

ELECTRICAL
INSTALLATION WORKS

PROPOSED CONSTRUCTION OF SEED CENTRE FOR KEFRI AT THE CENTRAL HIGHLANDS ECO-REGION RESEARCH PROGRAMME – LONDIANI SEED CENTRE

WP ITEM No: D110/RU/KRO/2202 JOB No: 10966F

ELECTRICAL INSTALLATION WORKS

TENDER SPECIFICATIONS & BILLS OF

QUANTITIES FOR SUPPLY, INSTALLATION,

TESTING AND COMMISSIONING OF

ELECTRICAL INSTALLATION WORKS

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OF

MATERIALS AND WORKS

GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

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2.42 Steel Conduits and Steel Trunking

2.43 Testing on Site

2.1 GENERAL

This specification is to be read in conjunction with the drawings which are issued with it. Bills of quantities shall be the basis of all additions and omissions during the progress of the works.

2.2 STANDARD OF MATERIALS

Where the material and equipment are specifically described and named in the Specification followed by approved equal, they are so named or described for the purpose of establishing a standard to which the sub-contractor shall adhere.

Should the Sub-contractor install any material not specified herein before receiving approval from the proper authorities, the Engineer shall direct the Sub-contractor to remove the material in question immediately. The fact that this material has been installed shall have no bearing or influence on the decision by the Engineer.

All materials condemned by the Engineer as not approved for use, are to be removed from the premises and suitable materials delivered and installed in their place at the expense of the Sub-contractor. All materials required for the works shall be new and the best of the respective kind and shall be of a uniform pattern.

2.3 WORKMANSHIP

The workmanship and method of installation shall conform to the best standard practice. All work shall be performed by a skilled tradesman and to the satisfaction of the Engineer. Helpers shall have qualified supervision.

Any work that does not in the opinion of the Engineer conform to the best standard practice will be removed and reinstated at the Sub-contractor's expense.

Permits, Certificates or Licenses must be held by all tradesmen for the type of work; in which they are involved where such permits, certificates or licenses exist under Government legislation.

2.4 PROCUREMENT OF MATERIALS

The sub-contractor is advised that no assistance can be given in the procurement or allotment of any materials or products to be used in and necessary for the construction and completion of the work.

Sub-contractors are warned that they must make their own arrangements for the supply of materials and/or products specified or required.

2.5 SHOP DRAWINGS

Before manufacture or Fabrication is commenced the sub-contractor shall submit Two copies of detailed drawings of all control pillars, meter cubicles, medium voltage switchboards including their components showing all pertinent information including sizes, capacities, construction details, etc., as may be required to determine the suitability of the equipment for the approval of the Engineer. Approval of the detailed drawings shall not relieve the sub-contractor of the full responsibility of errors or the necessity of checking the drawings himself or of furnishing the materials and equipment and performing the work required by the plans and specifications.

2.6 RECORD DRAWINGS

These diagrams and drawings shall show the completed installation including sizes, runs and arrangements of the installation. The drawings shall be to scale not less than 1:50 and shall include plan views and section.

The drawings shall include all the details which may be useful in the operation, maintenance or subsequent modifications or extensions to the installation.

Three sets of diagrams and drawings shall be provided, all to the approval of the Engineer.

One coloured set of line diagrams relating to operating and maintenance instructions shall be framed and, mounted in a suitable location.

2.7 REGULATIONS AND STANDARDS

All work executed by the Sub-contractor shall comply with the current edition of the "Regulations" for the Electrical Equipment of Buildings, issued by the Institution of Electrical Engineers, and with the Regulations of the Local Electricity Authority.

Where the two sets of regulations appear to conflict, they shall be clarified with the Engineers. All materials used shall comply with relevant Kenya Bureau of Standards Specification.

2.8 SETTING OUT WORK

The sub-contractor at his own expenses; is to set out works and take all measurements and dimensions required for the erection of his materials on site; making any modifications in details as may be found necessary during the progress of the works, submitting any such modifications or alterations in detail to the Engineer before proceeding and must allow in his Tender for all such modifications and for the provision of any such sketches or drawings related thereto.

2.9 POSITIONS OF ELECTRICAL PLANT AND APPARATUS

The routes of cables and approximate positions of switchboards etc, as shown on the drawings shall be assumed to be correct for purpose of Tendering, but exact positions of all electrical Equipment and routes of cables must be agreed on site with the Engineer before any work is carried out.

2.10 MCB DISTRIBUTION PANELS AND CONSUMER UNITS

All cases of MCB Panels and consumer units shall be constructed in heavy gauge sheet with hinged covers.

Removable undrilled gland plates shall be provided on the top and bottom of the cases. Miniature circuit breakers shall be enclosed in moulded plastic with the tripping mechanism and arc chambers separated and sealed from the cable terminals.

The operating dolly shall be tripfree with a positive movement in both make and break position. Clear indication of the position of the handle shall be incorporated.

The tripping mechanism shall be on inverse characteristic to prevent tripping in temporary overloads and shall not be affected by normal variation in ambient temperature.

A locking plate shall be provided for each size of breaker; A complete list of circuit details on typed cartridge paper glued to stiff cardboards and covered with a sheet of Perspex, and held in position with four suitable fixings, shall be fitted to the inner face of the lids of each distribution panel. The appropriate MCB ratings shall be stated on the circuit chart against each circuit in use: Ivorine labels shall be secured to the insulation barriers in such a manner as to indicate the number of the circuits shown on the circuit chart.
Insulated barriers shall be fitted between phases, and neutrals in all boards, and to shroud live parts.

Neutral cables shall be connected to the neutral bar in the same sequence as the phase cables are connected to the MCB's. This shall also apply to earth bars when installed.

2.11 FUSED SWITCHGEAR AND ISOLATORS

All fused switchgear and isolators whether mounted on machinery, walls or industrial panels shall conform to the requirements of KS 04 – 226 PART: 1: 1985.

All contacts are to be fully shrouded and are to have a breaking capacity on manual operations as required by KS 04 – 182: 1980.

Fuse links for fused switches are to be of high rupturing capacity cartridge type, conforming to KS 04 – 183: 1978.

Isolators shall be load breaking/fault making isolators.

Fused switches and isolators are to have separate metal enclosures. Mechanical interlocks are to be provided between the door and main switch operating mechanism so arranged that the door may not be opened with the switch in the 'ON' position. Similarly; it shall not be possible to close the switch with the door open except that provision to defeat the mechanical interlock and close the switch with the door in the open position for test purposes. The 'ON' and 'OFF' positions of all switches and isolators shall be clearly indicated by a mechanical flag indicator or similar device. In T.P & N fused switch units, bolted neutral links are to be fitted.

2.12 CONDUITS AND CONDUIT RUNS

Conduit systems are to be installed so as to allow the loop-in system of wiring:

All conduits shall be black rigid super high impact heavy gauge class 'A' PVC in accordance with KS 04 – 179: 1988 and IEE Regulations. No conduit less than 20mm in diameter shall be used anywhere in this installation.

Conduit shall be installed buried in plaster work and floor screed except when run on wooden or metal surface when they will be installed surface supported with saddles every 600mm. Conduit run in chases shall be firmly held in position by means of substantial pipe hooks driven into wooden plugs.

The Sub-contractor's attention is drawn to the necessity of keeping all conduits entirely separate from other piping services such as water and no circuit connections will be permitted between conduits and such pipes.
All conduits systems shall be arranged wherever possible to be self-draining to switch boxes and conduit outlet points for fittings:

The systems, when installed and before wiring shall be kept plugged with well fitting plugs and when short conduit pieces are used as plugs, they shall be doubled over and tied firmly together with steel wire; before wiring all conduit systems shall be carried out until the particular section of the conduit installation is complete in every respect.

The sets and bends in conduit runs are to be formed on site using appropriate size bending springs and all radii of bends must not be less than 2.5 times the outside diameter of the conduit. No solid or inspection bends, tees or elbows will be used.

Conduit connections shall either be by a demountable (screwed up) assembly or adhesive fixed and water tight by solution. The tube and fittings must be clean and free of all grease before applying the adhesive. When connections are made between the conduit and switch boxes, circular or non-screwed boxes, care shall be taken that no rough edges of conduit stick out into the boxes.

Runs between draw in boxes are not to have more than two right angle bends or their equivalent. The sub-contractor may be required to demonstrate to the Engineers that wiring in any particular run is easily withdrawable and the sub-contractor may, at no extra cost to the contract; be required to install additional draw-in boxes required. If conduit is installed in straight runs in excess of 6000mm, expansion couplings as manufactured by Egatube shall be used at intervals of 6000mm.

Where conduit runs are to be concealed in pillars and beams, the approval of the Structural Engineer, shall be obtained. The sub-contractor shall be responsible for marking the accurate position of all holes chases etc, on site, or if the Engineer so directs, shall provide the Main Contractor with dimensional drawings to enable him to mark out and form all holes and chases. Should the sub-contractor fail to inform the main contractor of any inaccuracies in this respect they shall be rectified at the sub-contractor's expense.

It will be the Sub-contractor's responsibility to ascertain from site, the details of reinforced concrete or structural steelwork and check from the builder's drawings the positions of walls, structural concrete and finishes. No reinforced concrete or steelwork may be drilled without first obtaining the written permission of the Structural Engineer.

The drawings provided with these specifications indicate the appropriate positions only of points and switches, and it shall be the Sub-Contractors responsibility to mark out and centre on site the accurate positions where necessary in consultation with the Architect and the Engineer. The sub-contractor alone shall be responsible for the accuracy of the final position.

2.13 CONDUIT BOXES AND ACCESSORIES

All conduit outlets and junction boxes are to be either malleable iron and of standard circular pattern of the appropriate type to suit saddles being used or super high impact PVC manufactured to KS 04 – 179 : 1983.

Small circular pattern boxes are to be used with conduits up to and including 25mm outside diameter. Rectangular pattern adaptable boxes are to be used for conduits of 32mm outside diameter and larger. For drawing in of cables in exposed runs of conduit, standard pattern through boxes are to be used:

Boxes are to be not less than 50mm deep and of such dimensions as will enable the largest appropriate number of cables for the conduit sizes to be drawn in without excessive bending.

Outlet boxes for lighting fittings are to be of the loop-in type where conduit installation is concealed and the sub-contractor shall allow one such box per fitting, except where fluorescent fittings are specified when two such boxes per fitting shall be fitted flush with ceiling and if necessary fitted with break joint rings. Pattresses shall be fitted where required to outlets on surface conduit runs.

Adaptable boxes are two of PVC or mild steel (of not less than 12swg) and black enamelled or galvanised finish according to location. They shall be of square or oblong shape location. They shall be of square or oblong shape complete with lids secured by four 2 BA brass roundhead screws; No adaptable box shall be less than 75mm x 75mm x 50mm or larger than 300mm x 300mm x 75mm and shall be adequate in depth in relation to the size of conduit entering it. Conduits shall only enter boxes by means of conduit bushes.

2.14 LABELS

Labels fitted to switches and fuse boards; -

(i) Shall be Ivorine engraved black on white.

(ii) Shall be secured by R.H brass screws of same manufacturing throughout.

(iii) Shall be indicated on switches: -
- a) Reference number of switch
- b) Special current rating
- c) Item of equipment controlled

(iv) Shall indicate on MCB panels
- a) Reference number
- b) Type of board, i.e.; lighting, sockets, etc.
- c) Size of cable supplying panel
- d) where to isolate feeder cable

(v) Shall be generally not less than 75mm x 50mm.

2.15 EARTHING

The earthing of the installation shall comply with the following requirements; -

(i) It shall be carried out in accordance with the appropriate sections of the current edition of the Regulations, for the Electrical Equipment of Buildings issued by Institute of Electrical Engineers of Great Britain.

(ii) At all main distribution panels and main service positions a 25mm x 3mm minimum cross sectional area Copper tape shall be provided and all equipment including the lead sheath and armouring of cables, distribution boards and metal frames shall be bonded thereto.

(iii) The earth tape in Sub-clause (ii) shall be connected by means of a copper tape or cable of suitable cross sectional area to an earth electrode which shall be a copper earth rod (see later sub-clause).

(iv) All tapes to be soft high conductivity copper, untinned except where otherwise specified and where run underground on or through walls, floors, etc., it shall be served with corrosion resisting tape or coated with corrosion compound and braided

(v) Where the earth electrode is located outside the building a removable test link shall be provided inside the building as near as possible to the point of entry to the tape, for isolating the earth electrode for testing purposes.

(vi) Earthing of sub-main equipment shall be deemed to be satisfactory where the sub-main cables are M.I.C.S. or conduit with separate earth wire, and installation is carried out in accordance with the figures stated in the current edition of the I.E.E Regulations.

(vii) Where an earth rod is specified (see Sub-clause (iii) it shall be proprietary manufacture, solid hand drawn copper of 15mm diameter driven into the ground to a minimum depth of 3.6M. It shall be made up to 1.2m sections with internal screw and socket joints and fitted with hardened steel tip and driving cap.

(viii) Earth plates will not be permitted

(ix) Where an earth rod is used the earth resistance shall be tested in the manner described in the current edition of the IEE Regulations, by the Sub-Contractor in the presence of the Engineer and the Sub-Contractor shall be responsible for the supply of all test equipment.

(x) Where copper tape is fixed to the building structure it shall be by means of purpose made non-ferrous saddles which space the conductor away from the structure a minimum distance of 20mm. Fixings, shall be made using purpose made plugs; No fixings requiring holes to be drilled through the tape will be accepted.

(xi) Joints in copper tape shall be tinned before assembly riveted with a minimum of two copper rivets and seated solid.

(xii) Where holes are drilled in the earth tape for connection to items of equipment the effective cross sectional area must not be less than required to comply with the IEE regulations.

(xiii) Bolts, nuts and washers for any fixing to the earth tape must be of non-ferrous material.

(xiv) Attention is drawn to the need for the earthing metal parts of lighting fittings and for bonding ball joint suspension in lighting fittings.

2.16 CABLES AND FLEXIBLE CORDS

All cables used in this Sub-Contract shall be manufactured in accordance with the current appropriate Kenya standard Specification which are as follows:-

P.V.C. Insulated Cables and Flexible Cords	---	Ks 04-192:1988
P.V.C Insulated Armoured Cables	---	Ks 04-194:1990
Armouring of Electric cables	---	Ks 04-290:1987

The successful Sub-Contractor will, at the Engineers discretion be required to submit samples of cables for the Engineers approval; the Engineer reserves the right to call for the cables of an alternative manufacture without any extra cost being incurred.

P.V.C. insulated cables shall be 500/1000 volt grade. No cables smaller than 1.5mm² shall be used unless otherwise specified. The installation and the finish of cables shall be as detailed in later clauses. The colour of cables shall conform to the details stated in the "Cable Braid and insulation Colours" Clause.

2.17 ARMOURED P.V.C. INSULATED AND SHEATHED CABLES:

Shall be 600/1000 volt grade manufactured to Ks 04-194:1988 and Ks 04-187/188 with copper stranded conductors.

The wire armour of the cable shall be used wholly as an earth continuity conductor and the resistance of the wire armour shall have a resistance not more than twice of the largest current carrying conductor of the cable.

P.V.C./S.W.A./P.V.C. cables shall be terminated using "Telecom" "B" type or approved equal or approved equal glands and a P.V.C. tapered sleeve shall be provided to shroud each gland.

2.18 CABLE SUPPORTS, MARKERS AND TILES

All PVC/SWA/PVC cables run inside the building shall be fixed in rising ducts or on ceilings by means of die cast cable hooks or clamps, of appropriate size to suit cables, fixed by studs and back nuts to their channel sections.

Alternatively, fixing shall be by BICC claw type cleating system with die-cast cleats and galvanised mild steel back straps or similar approved equal method. For one or two cables run together the cleats shall be fixed a special channel section supports or backstraps described above which shall in turn be secured to walls or ceilings of ducts by rawbolts.

In excessively damp or corrosive atmospheric conditions special finishes may be required and the Sub-contractor shall apply to the Engineer for further instructions before ordering cleats and channels for such areas.

The above type of hooks and clamps and channels or cleats and blackstraps shall also be used for securing cables in vertical ducts.

Cables supports shall be fixed at 600mm maximum intervals, the supports being supplied and erected under this Sub-contract. Saddles shall not be used for supporting cables nor any other type of fixing other than one of the two methods described above or other system which has received prior approval of the Engineer;

Cables are to be kept clear of all pipe work and the Sub-contractor shall work in close liaison with other services Sub-contractors.

The Sub-Contractor shall include for the provision of fixing of approved type coloured slip on cables end markers to indicate permanently the correct phase and neutral colours on all ends.

Provision shall be made for supplying and fixing approved non-corrosive metal cable markers to be attached to the outside of all PVC/SWA/PVC cables at 15mm intervals indicating cable size and distinction.

Where PVC/SWA/PVC cables are outside the building they shall be laid underground 750mm deep with protecting concrete interlocking cover tiles laid over which shall be provided and laid under this Sub-contract.

All necessary excavations and reinstatement of ground including sanding or trenches will be carried out by the Sub-Contractor, unless otherwise stated.

2.19 PVC INSULATED CABLES

Shall be of non-braided type as CMA reference 6491 x 600/1000/1000-volt grade cables, or equal approved.

PVC cables shall conform to the details of the "Cables and Flexible cords" and "Cable Braid and Insulation Colours" clauses.

2.20 HEAT RESISTING CABLES

Final connections to cookers, water heaters, etc., shall be made using butyl rubber insulated cable as CMA reference 610 butyl (Single core 600/1000 Volt).

This type of cable shall be used in all instances where a temperature exceeding 100°F, but not exceeding 150°F is likely to be experienced. Final connections to all lighting fittings (and other equipment where a temperature in excess of 150°c likely to be experienced) shall be made using silicon rubber insulated cable or equal and approved.

2.21 FLEXIBLE CORDS

Shall be in accordance with the "Cable and Flexible Cords" clause. No cord shall be less than 24/0.2mm in size unless otherwise specified.

Circular white twin TRS flex shall be used for plain pendant fittings up to 100 watts. For all other types of lighting fittings, the flexible cable shall be silicone rubber insulated.

No polythene insulated flexible cable shall be used in any lighting fitting or other appliance (see "Heat Resisting Cables" Clause 30).

2.22 CABLE ENDS AND PHASE COLOURS

All cable ends connected up in switchgear, MCB panels etc, shall have the insulation carefully cut back and the ends sealed with Hellerman rubber slip on cable end markers.

The markers shall be of appropriate phase colour for switch and all other live feeds to the details of the "Cable Insulation Colours" clause. Black cable with black end markers shall only be used for neutral cables.

2.23 CABLE INSULATION COLOURS

Unless otherwise stated in later clauses the insulation colours shall be in accordance with the following table.

Where other systems are installed the cable colours shall be in accordance with the details stated in the appropriate clause.

SYSTEM	INSULATION COLOUR	CABLE END MARKER
1) **Main and Sub-Main**		
a) Phase	Red	Red
b) Neutral	Black	Black
2) **Sub-Circuits Single Phase**		
a) Phase	Red	Red
b) Neutral	Black	Black

2.24 SUB-CIRCUIT WIRING

For all lighting and sockets wiring shall be carried out in the "looping in" system and there shall be no joints whatsoever. No lighting circuits shall comprise more than 20 points when protected by 10A MCB. Cables with different cross-section area of copper shall not be used in combination.

Lighting circuits P.V.C. cable.

(i) 1.5mm² for all lighting circuits indicated on the drawing.

Power circuits P.V.C cable (minimum sizes).

(ii) 2.5mm² for one, two or three 5Amp sockets wired in parallel.

(iii) 2.5mm² for one 15Amp socket.

(iv) 2.5mm² for maximum of ten switched 13 Amp sockets wired from 30 Amp MCB.

The wiring sizes for lighting circuits and sockets are shown on the drawings. In such cases, the sizes shown on the drawings shall prevail over the sizes specified.

Wiring sizes for other appliances shall be shown on the drawing or specified in later clauses of this specification.

2.25 SPACE FACTOR

The maximum number of cables that may be accommodated in a given size of conduit or trunking or duct is not to exceed the number in Tables B.5 and B.6 or as stated in Regulation B.91, B.117 and B.118 of the I.E.E Regulations whichever is appropriate.

2.26 INSULATION

The insulation resistance to earth and between poles of the whole wiring system, fittings and lumps, shall not be less than the requirements of the latest edition of the I.E.E Regulations. Complete tests shall be made on all circuits by the Sub-contractor before the installations are handed over.

A report of all tests shall be furnished by the Sub-Contractor to the Engineer. The Engineer will then check test with his own instruments if necessary.

2.27 LIGHTING SWITCHES

These shall be mounted flush with the walls, shall be contained in steel or alloy boxes and shall be of the gangs' ratings and type shown in the drawings. They shall be as manufactured by M.K. Electrical Ltd., or other equal and approved to KS 04 – 247: 1988

2.28 SOCKETS AND SWITCHED SOCKETS

These shall be flush pattern in steel/pvc box and shall be of the gangs and type specified in the drawings.

They shall be 13- Amp, 3-pin, shuttered, switched and as manufactured by "M.K. Electrical Co. Ltd.", or other approved equal to KS 04 – 246: 1987

2.29 FUSED SPUR BOXES

These shall be flush, D.P switched as in steel/pvc box and of type and make specified in the drawings complete with pilot light and as manufactured by "M. K. Electrical Company Ltd", or other approved equal. KS 04 – 247: 1988

2.30 COOKER OUTLETS

These shall be flush mounted with 13-A switched socket outlet and neon indicator Lamps.

The cooker control units shall be as manufactured by "M.K. Electrical Company Ltd", or other approved equal KS 04 – 247: 1988

2.31 CONNECTORS

Shall be specified in the drawings and appropriate rating. These shall be fitted at all conduit box lighting point outlets for jointing of looped P.V.C cables with flexible cables of specified quality.

2.32 LAMPHOLDERS

Shall be of extra heavy H.O skirted and shall be provided for every specified lighting fitting and shall be B.C;, E.S;, or G.E.S as required. All E.S. and G.E.S. holders shall be heavy brass type (except for plain pendants where the reinforced bakelite type shall be used). The screwed cap of the E.S and G.E.S. holders shall be connected to the neutral.

Where lampholders are supported by flexible cable, the holders shall have "cord grip" arrangements and in the case of metal shades earthing screws shall be provided on each of the holders.

The Sub-Contractor must order the appropriate type of holder when ordering lighting fittings, to ensure that the correct types of holders are provided irrespective of the type normally supplied by the manufacturers.

2.33 LAMPS

All lamps shall be suitable for normal stated supply voltage and the number and sizes of lamps detailed on the drawings shall be supplied and fixed. The Sub-Contractor must verify the actual supply voltage with the supply authority before ordering the lamps.

Tungsten filament lamps shall be manufactured in accordance with KS 04 – 112:1978 for general service lamps and KS 04 – 307:1985 for lamps other than general services. Tubular fluorescent lamps shall comply with KS 04 – 464:1982

Pearl lamps shall be used in all fittings unless otherwise specified.

2.34 LIGHTING FITTINGS AND STREET LIGHTING LANTERNS

This Sub-Contract shall include for the provision, handling charges, taking the delivery, safe storage, wiring (including internal wiring) assembling and erecting of all lighting fittings shown on the drawings.

All fittings and pendants shall be fixed to the conduit boxes with brass R/H screws. These to be in line with metal finish of fittings. The lighting fittings are detailed for the purpose of establishing a high standard of finish and under no circumstances will substitute fittings be permitted.

In case of rectangular shaped ceiling fittings, the extreme ends of the fittings shall be secured to suitable support in addition to the central conduit box fittings. Supports shall be provided and fixed by the Sub-Contractor.

The whole of the metal work of each lighting fittings shall be effectively bonded to earth. In the case of ball and/or knuckle joints short lengths of flexible cable shall be provided, bonded to the metal work on either side of the joints. If the above provisions are not made by the manufacturers -, the Sub-contractor shall include cost of additional work necessary in his tender. See "Flexible Cords" clause for details of internal wiring of lighting fittings.

Minimum size of internal wiring shall be 20/0.20mm (23/0067). Each lighting fitting shall be provided with number type and size of lamps as detailed on the drawings. It is to be noted that some fittings are suspended as shown on the drawings.

Where two or more points are shown adjacent to each other on the drawings, e.g. socket outlet and telephone outlet, they shall be lined up vertically or horizontally on the centre lines of the units concerned.

Normally, the units shall be lined up on vertical centre lines, but where it is necessary to mount units at low level they shall be lined up horizontally.

2.35 POSITIONS OF POINTS AND SWITCHES

Although the approximate positions of all points are shown on the drawings, enquiry shall be made as to the exact positions of all M.C.B panels, lighting points, socket outlets etc, before work is actually commenced. The Sub-contractor must approach the Architect with regard to the final layout of all lights on the ceiling and walls.

The Sub-contractor must consult with the Engineer in liaison with the Clerk of Works, or the General Foreman on site regarding the positions of all points before fixing any conduit etc. The Sub-Contractor shall be responsible for all alterations made necessary by the non-compliance with the clause.

2.36 STREET/SECURITY OUTDOOR LIGHTING COLUMNS:

The column shall be at a minimum of 225mm in the ground on 75mm thick concrete foundations and the pole up to 150mm shall be surrounded with concrete. The top bracket and plain section of the columns shall be common to and interchangeable with all brackets with maximum mismatching tolerance of 3mm between any pole and bracket. After manufacture and before erection the columns shall be treated with an approved mordant solution which shall be washed off and the whole allowed to dry. Thereafter, the columns shall be painted with one undercoat and two coats of gloss paint to an approved colour. All columns shall be complete with fused cut-outs.

2.37 TIMING CONTROL SWITCH

These shall be installed where shown on the drawings. Photocell timing control circuits which will operate 'on' with a specified level of darkness and 'off' with a given level of light. The initial adjustment will be done with approval of the Electrical Engineer.

2.38 WIRING SYSTEM FOR STREET LIGHTING

Cables shall be as indicated on the drawings, and shall be laid in a cable trench 450mm deep along the road sides and 600mm deep across the roads and 900mm away from the road kerb or 1500mm away from the edges of the road. 'Loop-in' and 'Loop-out' arrangement shall be used at every pole. Wiring to the lanterns on each pole shall be with 1.5mm² PVC twin insulated and sheathed cable with earth wire shall be laid at least 600mm below the finished road level on a compact bed of murram at least 50mm thick and covered with a concrete surrounded 150mm thick.

2.39 METAL CONTROL PILLAR

These shall be metal clad and fabricated as per contract drawings and specification. The Sub-Contractor shall supply, install, test and commission control pillars including supplying, fixing connecting switchgears as detailed on the appropriate drawings.

2.40 CURRENT OPERATED EARTH LEAKAGE CIRCUIT BREAKER

Current operated earth leakage circuit breaker shall conform to B.S.S. 4293:68 rated at 240 volts D.P. 50 cycles A.C. Mains.

The breaker shall be provided with test switch and fitted in weather proof enclosure for surface mounting. The rated load current and earth fault operating current shall be as specified in the drawings. These shall be as manufactured by Crabtree, Siemens or other equal and approved.

2.41 M.V. SWITCHBOARD AND SWITCHGEAR

The switchboard shall be manufactured in accordance with KS04-226 which co-ordinates the requirements for electrical power switchgear and associated apparatus. It is not intended that this K.S. should cover the requirements for specified apparatus for which separate Kenyan Standard exist. All equipment and material used in the switchboard shall be in accordance with the appropriate Kenya Standard.

The switchboard shall comprise the equipment shown on the drawings together with all current transformers, auxiliary fuses, labels, small wiring and interconnections necessary for the satisfactory operation of the switchboard.

The Switchboard shall be of the flush fronted, enclosed, metal clad type with full front or rear access as called for in the particular specifications, suitable for indoor use, sectionalized as necessary to facilitate transport and erection. The maximum height of the switchboard is to be approximately 2.0 metres. A suitable connection chamber containing all field terminals shall be provided at the top or bottom of the switchboard as appropriate.

Before manufacture, the Sub-Contractor shall submit to the consulting Engineer for approval of detailed drawings showing the layout, construction and connection of the switchboard.

All bus-bars and bus-bar connections shall consist of high conductivity copper and be provided in accordance with KS 04-226: 1985. The bus-bars shall be clearly marked with the appropriate phase and neutral colours which should be red, yellow, blue for the phases and black for neutral. The bus-bars shall be so arranged in the switchboard that the extensions to the left and right may be made in the future with ease should the need arise.

Small wiring, which will be neatly arranged and cleated, shall be executed in accordance with B.S. 158 and the insulation of the wiring shall be coloured according to the phase or neutral connection.

Switches and fuse switches, shall be in strict accordance with KS04-183:1978 Class 2 switches. Means of locking the switch in the "OFF" position shall be provided.

All fuse switches shall comply with KS04-183:1978, PARTS 2 and 3 a fault rating at least equal to the fault rating of the switchboard in which they are installed. Cartridge fuse links to KS 04-183:1978 category A.C. 46, class Q1 and fusing factor not exceeding 1.5 shall be supplied with each fused switch.

Mounting arrangements shall be such that individual complete fuse switches may be disconnected and withdrawn when necessary without extensive dismantling work.

When switches are arranged in their formation all necessary horizontal and vertical barriers shall be provided to ensure segregation from adjacent units. Means of locking the switch in the "OFF" position shall be provided.

2.42 STEEL CONDUITS AND STEEL TRUNKING

Conduits shall be of heavy gauge class "B" welded to Standard specification KS 04-180:1985. In no case will conduit smaller than 20mm diameter be used on the works. Conduits installed within buildings shall be black enamelled finish except where specified otherwise. Where installed externally or in damp conditions they shall be galvanised. Conduit fittings, accessories or equipment used in conjunction with galvanised conduits shall also be galvanised or otherwise as approved by the service engineer.

Metal trunking shall be fabricated from mild steel of not less than 18 swg. All sections of trunking shall be rigidly fixed together and attached to the framework or fabric or the building at intervals of not less than 1.2m. Joint trunking shall not overhang fixing points by more than 0.5m.

All trunking shall be made electrically continuous by means of 25 x 3mm copper links across each joint and where the trunking is galvanised, the links shall be made by galvanised flat iron strips.

All trunking fittings (i.e. Bends, tees, etc) shall leave the main through completely clear of obstructions and continuously open except through walls and floors at which points suitable fire resisting barriers shall be provided as may be necessary. The inner edge of bends and tees shall be chamfered where cables larger than 35mm² are employed.

Where trunking passes through ceilings and walls the cover shall be solidly fixed to 150mm either side of ceilings and floors and 50mm either side of walls.

Screws and bolts securing covers to trunking or sections of covers together shall be arranged so that damage to cables cannot occur either when fixing covers or when installing cables in the trough.

Where trunking is used to connect switchgear of fuseboards, such connections shall be made by trunking fittings manufactured for this purpose and not by multiple conduit couplings.

Where vertical sections of trunking are used which exceed 4.5m in length, staggered tie off points shall be provided at 4.5m intervals to support the weight of cables.

Unless otherwise stated, all trunking systems shall be painted as for conduit.

Where a wiring system incorporates galvanised conduit and trunking, the trunking shall be deemed to be galvanised unless specified otherwise.

The number of cables to be installed in trunking shall be such as to permit easy drawing in without damage to the cables, and shall in no circumstances be such that a space factor of 45% is exceeded.

Conduit and trunking shall be mechanically and electrically continuous. Conduit shall be tightly screwed between the various lengths so that they butt at the socketed joints. The internal edges of conduit and all fittings shall be smooth, free from burrs and other defects.

Oil and any other insulating substance shall be removed from the screw threads; where conduits terminate in fuse-gear, distribution boards, adaptable boxes, non-spouted switchboxes, etc., they shall, unless otherwise stated, be connected thereto by means of smooth bore male brass bushes, compression washers and sockets. All exposed threads and abrasions shall be painted using an oil paint for black enameled tubing and galvanizing paint for galvanised tubing immediately after the conduits are erected. All bends and sets shall be made cold without altering the section of the conduit.

The inner radius of the bed shall not be less than four (4) times the outside diameter of the conduit. Not more than two right angle bends will be permitted without the inter-position of a draw-in-box. Where straight runs of conduit are installed, draw-in-boxes shall be provided at distances not exceeding 15mm. No tees, elbows, sleeves, either of inspection or solid type, will be permitted.

Conduit shall be swabbed out prior to drawing in cables, and they shall be laid so as to drain of all condensed moisture without injury to end connections.

Conduits and trunking shall be run at least 150mm clear of hot water and steam pipes, and at least 75mm clear of cold water and other services unless otherwise approved by the services engineer.

All boxes shall conform to KS 04 – 668: 1986, to be of malleable iron, and black enamelled or galvanized according to the type of conduit specified. All accessory boxes shall have threaded brass inserts.

Box lids where required shall be heavy gauge metal, secured by means of zinc plated or cadmium plated steel screws.

All adaptable boxes and lids of the same size shall be interchangeable.
Boxes used on surface work are to be tapped or drilled to line up with the conduit fixed in distance type saddles allowing clearance between the conduit and wall without the need for setting the conduit.

Where used in conjunction with mineral insulated copper sheathed cable, galvanized boxes shall be used and painted after erection.

Draw-in boxes in the floors are generally to be avoided but where they are essential they must be grouped in positions approved by the services engineer and covered and by the suitable floor traps, with non-ferrous trays and covers.

The floor trap covers are to be recessed and filled in with a material to match the floor surface.

The Sub-contractor must take full responsibility for the filling in of all covers, but the filling in material will be supplied and the filling carried out by the main building contractor.

Where buried in the ground outside the building the whole of the buried conduit is to be painted with two coats of approved bitumastic composition before covering up.

Where run on the surface, unpainted fittings and joints shall be painted with two coats of oil bound enamel applied to rust and grease free metalwork.

2.43 TESTING ON SITE

The Sub-contractor shall conduct during and at the completion of the installation and, if required, again at the expiration of the maintenance period, tests in accordance with the relevant section of the current edition of the Regulations for the electrical equipment of buildings issued by the I.E.E of Great Britain, the Government Electrical Specification and the Electric Supply Company's By-Laws.

(a) Tests shall be carried out to prove that all single pole switches are installed in the 'live' conductor.

(c) Tests shall be carried out to prove that all socket outlets and switched socket outlets are connected to the 'live' conductor in the terminal marked as such, and that each earth pin is effectively bonded to the earth continuity system. Tests shall be carried out to verify the continuity of all conductors of each 'ring' circuit.

(d) Phase tests shall be carried out on completion of the installation to ensure that correct phase sequence is maintained throughout the installation. Triplicate copies of the results of the above tests shall be provided within 14 days of the witnessed tests and the Sub-contractor will be required to issue to the service engineer the requisite certificate upon completion as required by the regulations referred to above.

(e) Any faults, defects or omissions or faulty workmanship, incorrectly positioned or installed parts of the installation made apparently by such inspections or tests shall be rectified by the Sub-contractor at his own expense.

(f) The Sub-contractor shall provide accurate instruments and apparatus and all labour required to carry out the above tests. The instruments and apparatus shall be made available to the services engineer to enable him to carry out such tests as he may require.

(g) The Sub-contractor shall generally attend on other contractors employed on the project and carry out such electrical tests as may be necessary.

(h) The Sub-contractor shall test to the services engineer's approval and as specified elsewhere in this specification or in standards and regulations already referred to, all equipment, plant and apparatus forming part of the works and before connecting to any power or other supply and setting to work.

(i) Where such equipment, etc., forms part of or is connected to a system whether primarily or of an electrical nature or otherwise (e.g. air conditioning system) the Sub-contractor shall attend on and assist in balancing, regulating testing and commissioning, or if primarily an electrical or other system forming part of works, shall balance, regulate, test and commission the system to the service engineer's approval.

APPENDIX TO GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

The electrical sub-contractor shall comply with the following: -

1. Government Electrical Specifications No. 1 and No. 2.

2. All requirements of Kenya Power and Lighting Company Limited, and Communications Authority of Kenya (CAK).

SECTION C

SCHEDULE OF CONTRACT DRAWINGS

SCHEDULE OF CONTRACT DRAWINGS

DRAWING NO.	DRAWING TITLE
As shall be issued by the Engineer	

NOTE:

Tenderers are advised to inspect the electrical drawings at the office of the **Chief Engineer (Electrical) – Ministry of Lands, Public Works, Housing & Urban Development, State Department for Public Works**, at Chief Engineer's (Electrical) office, Hill Plaza Building, Community area, Nairobi along Ngong road, during normal working hours.

The drawings shall however be availed, on award of the tender, to the sub-contractor.

SECTION D

PARTICULAR SPECIFICATIONS

OF

MATERIALS AND WORKS

PARTICULAR SPECIFICATIONS

1.00 SITE LOCATION

The site of the proposed works is located at **Londiani, Kericho County.**

2.00 SCOPE OF WORKS

The works to be carried out under this sub-contract comprise supply, installation, testing and commissioning of the following: -

a) **Electrical Works**
This shall include conduiting, cabling, fittings and accessories.

3.00 MATERIALS FOR THE WORKS

Materials shall be as specified in Section D and in the Bills of Quantities of this document which shall be read in conjunction with contract drawings. Alternative materials shall be accepted only after approval by the Project Electrical Engineer.

4.00 BROCHURES FOR FIRE ALARM PANEL & ANY ELECTRICAL EQUIPMENT AND FITTINGS

For consideration and qualification tenderers shall, at their own cost, provide coloured manufacturer's brochures detailing technical literature and specifications where applicable.

5.00 Compliance to Technical Specifications

ITEM	Description	COMPLIANCE	
		√	×
1	LIGHT FITTINGS a) Type 3 i. LED Type ii. 3,000 Lumens iii. Efficiency: ≥90Lm/Watt iv. Waterproof v. IP65 vi. Power Factor: ≥ 0.9 vii. Operating Frequency Range:50 – 60Hz viii. Operating Voltage Range: 220 – 240Vac ix. Correlated Colour Temperature (CCT): ≥ 6500K x. Median Useful life: 20,000 Hours b) Type 5 i. LED Type ii. 4,750 Lumens iii. Efficiency: ≥95Lm/Watt iv. IP65 v. Power Factor: ≥ 0.9 vi. Operating Frequency Range:50 – 60Hz vii. Operating Voltage Range: 220 – 240Vac viii. Correlated Colour Temperature (CCT): ≥ 6500K ix. Housing Material : Aluminum die-cast x. Optical cover/lens material: Tempered Glass		

ITEM	Description	COMPLIANCE	
		√	×
2	<u>SOCKETS</u> i) Twin 13A x 240V ii) White in colour iii) Screwless front plate		
3	<u>SWITCHES</u> i) Twin 10A x 240V ii) White in colour iii) Screwless Front Plate		
4	<u>INDUSTRIAL SOCKETS</u> i. 3 Pin & 5 Pin ii. 32A rating iii. Connectors fitted with cable entry gland iv. IP44 Splash proof v. Angled Surface vi. Top conduit or rear cable entry, complete with blanking plug vii. Operating Voltage Range 380V-415V (for 5 Pin Socket) viii. Operating Voltage Range 200V -250V (for 3 Pin socket) ix. Operating Frequency Range 50Hz-60Hz		
4	<u>ISOLATORS</u> i. 3 Pole ii. 63A rating iii. IP66		

Bidders must provide Technical Brochures to assess their technical compliance with these specifications

SECTION E

SCHEDULE OF UNIT RATES

SCHEDULE OF UNIT RATES

1. The tenderer shall insert unit rates against the items in the following schedules and may add such other items as he considers appropriate.

2. The unit rates shall include for supply, transport, insurance, delivery to site, storage as necessary, assembling, cleaning, installing, connecting, profit and maintenance in defects liability and any other obligation under this contract.

3. The unit rates will be used to assess the value of additions or omissions arising from authorised variations to the contract works.

4. Where trade names or manufacturer's catalogue numbers are mentioned in the specification, the reference is intended as a guide to the type of article or quality of material required. Alternative brands of **equal** and **approved** quality will be accepted.

5. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all all taxes applicable at the time of tender.

SCHEDULE OF UNIT RATES

ITEM	DESCRIPTION	QTY/UNIT	RATE(KSHS)
1.	4-way 125A TPN distribution board surface mounted complete with 125 A TP integral isolator and lockable cover and all accessories excluding MCBs as Schneider or approved equivalent	1No.	
2.	16-way 125A TPN distribution board surface mounted complete with 125 A TP integral isolator and lockable cover and all accessories excluding MCBs as Schneider or approved equivalent	1 No.	
3.	4 core 25mm2 armoured copper cable complete with all the necessary accessories	1 Metre	
4.	1 core 25mm2 insulated copper cable complete with all the necessary accessories	1 Metre.	
5.	1 core 35mm2 insulated copper cable complete with all the necessary accessories	1Metre	

SECTION F

BILLS OF QUANTITIES

BILLS OF QUANTITIES

A) PRICING OF PRELIMINARIES ITEMS

Prices will be inserted against item of preliminaries in the Contractor's Bills of Quantities and specification. These Bills are designated as Bill No.1 in this Section. Where the Contractor fails to insert his price in any item he shall be deemed to have made adequate provision for this on various items in the Bills of Quantities. The preliminaries form part of this contract and together with other Bills of Quantities covers for the costs involved in complying with all the requirements for the proper execution of the whole of the works in the contract.

The Bills of Quantities are divided generally into three sections:

(a) Preliminaries – Bill No.1

Contractor's preliminaries are as per those described in section C – Contract Preliminaries and General Conditions of Contract. The Contractor shall study the conditions and make provision to cover their cost in this Bill. The number of preliminary items to be priced by the Tenderer has been limited to tangible items such as site office, temporary works and others. However the Tenderer is free to include and price any other items he deems necessary taking into consideration conditions he is likely to encounter on site.

(b) Installation Items – Other Bills

(i) The brief description of the items in these Bills of Quantities should in no way modify or supersede the detailed descriptions in the contract Drawings, conditions of contract and specifications.

(ii) The unit of measurements and observations are as per those described in clause 1.0 5 of the section C.

(c) Summary

The summary contains tabulation of the separate parts of the Bills of Quantities carried forward with provisional sum, contingencies and any prime cost sums included. The Contract shall insert his totals and enter his grand total tender sum in the space provided below the summary.

This grand total tender sum shall be entered in the Form of Tender provided elsewhere in this document.

SPECIAL NOTES TO THE BILLS OF QUANTITIES

1. The Bills of Quantities form part of the contract documents and are to be read in conjunction with the contract drawings and general specifications of materials and works.

2. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all taxes applicable at the time of tender.

3. All prices omitted from any item, section or part of the Bills of Quantities shall be deemed to have been included to another item, section or part.

4. The brief descriptions of the items given in the Bills of Quantities are for the purpose of establishing a standard to which the sub-contractor shall adhere to. Otherwise alternative brands of **equal** and **approved** quality will be accepted.

   Should the sub-contractor install any material not specified here-in before receiving **approval** from the Project Manager, the sub-contractor shall remove the material in question and, **at his own cost**, install the proper material.

5. The grand total of prices in the price summary page must be carried forward to the **MAIN Summary Page**.

6. Tenderers must enclose, together with their submitted tenders, detailed coloured manufacturer's Brochures detailing Technical Literature and specifications on all the equipment they intend to offer.

KEFRI SEED CENTRE ELECTRICAL INSTALATION WORKS FOR LONDIANI					
	SCHEDULE 1: ELECTRICAL WORKS				
ITEM	DESCRIPTION	QTY	UNIT	RATE	TOTAL
	Supply, install, test and commission the following complete with all the necessary accessories as specified.				
1.00	LV BOARD & DISTRIBUTION BOARD				
1.01	Supply, install, test and commission a Semi Recessed Mounted LV Board at Switch Room manufactured in 12SWG galvanised mild steel sheet and finished in cream powder coating as shown on the schematic with 150A TP+N+E Bus Bars. The meter board should be complete with the following:				
	a) Incoming i) 1No. Incomer 100A TPN MCCB with current adjustable 0.5I-1.0I and shunt trip ii) 1No. Voltmeter 0-600V plus selector switch. iii) 1No. Ammeter plus selector switch with C.T.s (200/5) iv) 3No. Phase indicating lights v) 25kVAR Power Factor capacitor bank switched in 2 steps of 10kvars and 1 step of 5kvar vi) Space for Three Phase KPLC metering and fuses	1	No		
	b) Outgoing i) 1No. 80A TPN MCCB for DB(01) ii) 1No. 50A TPN MCCB for capacitor bank iii) Space for 3No. TPN MCCB				
1.02	12-way 125A TPN distribution board complete with 125A TP integral isolator and lockable cover and all accessories excluding MCBs as EZ9EDB12S125 or approved equivalent	1	No		
1.03	The following MCBs as Schneider or approved equivalent				
	i)10A SP MCB	3	No		
	ii) 20A SP MCB	5	No		
	iii) 20A TP MCB	5	No		
	iv) 32A SP MCB	3	No		
	v) Blanking Plates for Spareways	10	No		
	Total Carried Forward to Next Page				

ITEM	DESCRIPTION	QTY	UNIT	RATE	TOTAL
	Total Brought Forward from Previous Page				
1.04	5 x 25mm2 single core copper conductor cables drawn in 38mm Ø HG Conduits complete with all the necessary accessories from the Main LV Board to DB (01) as East African Cables or equal and approved equivalent	7	LM		
2.00	EARTHING THE LV BOARD				
2.01	Earthing comprising of copper earth electrode of size 1500mm long and 15mm diameter enclosed by a concrete manhole of size 300X300X450 mm with removable concrete cover and a 38mm diameter PVC heavy gauge lead in duct and bonded to the boards using 16mm sq cable as per the latest IEEE Requirements.	1	Item		
3.00	LIGHTNING PROTECTION				
3.01	Air termination spike comprising 1000mm by 15mm diameter copper rod, Copper multiple point air terminals and Copper ridge saddle as Furse or approved equivalent	3	No		
3.02	25x3mm pure copper tape including DC copper tape clips fixed at 1500mm intervals with all necessary accessories on the concrete wall as furse or approved equivalent.	60	LM		
3.03	Oblong test/junction clamp as FURSE or approved equivalent	2	No		
3.04	Copper square tape clamp for making crossing tape joints as furse or approved equivalent	4	No		
3.05	Earthing inspection concrete chamber 300mm x 300mm x 300mm with an air tight inspection cover to approval.	2	No.		
3.06	Earth electrode rod to downward conductor copper tape clamp as furse or approved equivalent	2	No		
3.07	Earthing with 15mm diameter 1800mm long copper earth rod, complete with driving head and clamped to the downward conductor	2	No		
	Total Carried Forward to Next Page				

ITEM	DESCRIPTION	QTY	UNIT	RATE	TOTAL
	Total Brought Forward from Previous Page				
4.00	<u>POWER POINTS</u>				
4.01	Power points wired Ring Mains using 2.5mm2 x 3 single core copper conductor cables drawn in 25mm diameter p.v.c/HG conduits concealed in concrete with all accessories but without the socket outlets	20	No		
4.02	Twin Socket outlets being 13A x 240V white moulded plate and flush mounted S.P.N socket outlets complete with screwless front plate as MK or equal and approved equivalent	20	No		
4.03	5 pin industrial socket point completely wired in 5×4.0mm2 PVC CU cables drawn in concealed 25mm Ø HG PVC conduits but without the industrial socket.	3	No		
4.04	5 pin industrial socket complete with plug as MK or approved equivalent	3	No		
4.05	3 pin industrial socket point completely wired in 3×4.0mm2 PVC CU cables drawn in concealed 25mm Ø HG PVC conduits but without the industrial socket.	1	No		
4.06	3 pin industrial socket complete with plug as MK or approved equivalent	1	No		
4.07	Extract fan circuit completely wired in 3×2.5mm2 PVC CU cables drawn in concealed 25mm Ø HG PVC conduits but without the extract Fan.	4	No		
4.08	Coldroom equipment point completely wired in 5×4.0mm2 PVC CU cables drawn in concealed 25mm Ø HG PVC conduits but without the Equipment.	2	No		
4.09	20A DP Switch as crabtree or approved equivalent	5	No		
4.10	63A Three Pole Isolator as katko or approved equivalent	5	No		
4.11	63A Two Pole Isolator as katko or approved equivalent	1	No		
	Total Carried Forward to Next Page				

ITEM	DESCRIPTION	QTY	UNIT	RATE	TOTAL
	Total Brought Forward from Previous Page				
6.00	LIGHTING POINTS				
6.01	Lighting point wired in 3×1.5 mm2 single core PVC copper cables drawn in 20mm diameter PVC heavy gauge conduits concealed in ceiling but excluding the light fitting itself.				
	i) One way switching	20	No		
	ii) Two way switching	25	No		
7.00	LIGHTING FITTINGS				
	i) Type 1	5	No		
	ii) Type 2	4	No		
	iii) Type 3	16	No		
	iv) Type 4	8	No		
	v) Type 5	9	No		
	vi) Type 6	3	No		
8.00	SWITCHES				
8.01	Lighting switches being 6Ax240V white moulded plate and flush mounted S.P.N Switches complete with screwless front plate and as MK or equal and approved equivalent				
	i) One Gang One Way	12	No		
	ii) One Gang Two Way	16	No		
8.02	Automatic Dusk till dawn outdoor light timer switch complete with contactor and as mk or approved equivalent	1	No		
9.00	Conduit Provisions				
9.01	Conduit Provisions for structured cabling points using 20mm Heavy Gauge conduits complete with patrices and blanking plates	20	No		
9.02	Conduit Provisions for cctv points using 20mm Heavy Gauge conduits complete with patrices and blanking plates	16	No		
9.02	Conduit Provisions for fire alarm points using 20mm Heavy Gauge conduits complete with patrices and blanking plates	10	LM		
	Total for Electrical Works carried forward to collection page				

COLLECTION PAGE		
Item	Description	Amount (KShs)
1	Schedule 1: Electrical Works	
2	Price for 3 sets of working drawings	
3	Price for 3 sets of as installed drawings	
4	Prepare and submit test results for the installation	
5	Allow for KPLC attendance by the contractor	
	GRAND TOTAL CARRIED FORWARD TO MAIN SUMMARY PAGE	

Amount of tender in words: Kenya Shillings……..

……

Domestic Subcontractor's Signature and Stamp……

Address……

Date……

Witness: Name and Signature……..

Address……

Date ……

SECTION G

TECHNICAL SCHEDULE

OF

ITEMS TO BE SUPPLIED

TECHNICAL SCHEDULE

1. The technical schedule shall be submitted by tenderers to facilitate and enable the Project Manager to evaluate the tenders, especially where the tenderer intends to supply or has based his tender sum on equipment which differs in manufacture, type or performance from the specifications indicated by the Project Manager.

2. The filling of this schedule forms part of Technical Evaluation of the tenders, and bidders shall therefore be required to indicate the type/make and country of origin of all the materials and equipment they intend to offer to the employer in this schedule.

3. This schedule shall form part of the technical evaluation criterion, and tenderers are therefore advised to complete the schedule as they shall be considered responsive.

TECHNICAL SCHEDULE OF ITEMS TO BE SUPPLIED

(To be completed by the Tenderer)

ITEM	DESCRIPTION	TYPE/MAKE	MODEL	COUNTRY OF ORIGIN
1	LED Light Fittings			
2	Lighting Switches			
3	Socket outlet			
4	Industrial Sockets			
5	Isolators			
6	Cables			
7	MCB			
8	MCCB			
9	Distribution Board			
10	LV Board			
11	PVC conduits			

SECTION H

SCHEDULE OF LIGHT FITTINGS

SCHEDULE OF LIGHT FITTINGS	
Type 1	600mmX600mm, 40W, 4000lm, 0.9 minimum power factor, backlit, IP20, 6500k Daylight, 25000 hours Medium Useful life, Full Window LED Panel Light, Office Compliant, complete with mounting and all other accessories and as PBLM17407K Panasonic or approved equivalent
Type 2	23W, 2000 Lumens, 20000 hours Medium Useful life, 6500k Daylight Back Lit LED circular Downlight of diameter Ø225mm and as DN027C 23W philips or approved equivalent
Type 3	1200mm, 30Watts, 3000 lumens, 6500k Daylight, 0.9 minimum power factor LED Light Fitting as WT035C LED30/CW PSU GM CFW L1200 Philips or approved equivalent
Type 4	20W, 1600 Lumens, 6500k Daylight, 20000h useful life, IP65 Polycarbonate Circular Smartbright Bulkhead of diameter Ø225mm and as WT045C LED20/NW PSU CFW L1665 Philips or approved equivalent
Type 5	Die cast aluminium, 50W, 4750 Lumens, 6500K Daylight, IP65, 0.9 power factor, LED Floodlight complete with all the necessary accessories and as BVP150 LED45/CW PSU 50W SWB G2 GM Philips or equal and approved equivalent
Type 6	600mm, 16W Slim section LED mirror Light fitting with acryllic reeded diffuser and three position polycarbonate end-caps cw pull cord as THORN ARROWSLIM

SECTION I

STANDARD FORMS

CONTENTS OF SECTION I

NOTE:

1.0 Tenderers must duly fill these Standard Forms as a mandatory requirement as they will form part the evaluation criteria.

2.0 Any tender returned with **Unfilled Standard Forms** shall be considered **Non-Responsive and shall automatically be disqualified.**

KEY PERSONNEL

Qualifications and experience of key personnel proposed for administration and execution of the Contract.

POSITION	NAME	HIGHEST QUALIFICATION *(Attach proof)*	YEARS OF EXPERIENCE (GENERAL)	YEARS OF EXPERIENCE IN PROPOSED POSITION
1. 2. 3. 4. 5. 6. 7.				

I certify that the above information is correct.

…….. …… ……

Title Signature Date

CONTRACTS COMPLETED IN THE LAST FIVE (5) YEARS

Work performed on works of a similar nature, complexity and volume over the last 5 years.

PROJECT NAME	*NAME OF CLIENT*	TYPE OF WORK AND YEAR OF COMPLETION	VALUE OF CONTRACT (KSHS.)

I certify that the above works were successfully carried out and completed by ourselves.

…… …… …….

Title Signature Date

SCHEDULE OF ON-GOING PROJECTS

Details of on-going or committed projects, including expected completion date.

PROJECT NAME	*NAME OF CLIENT*	CONTRACT SUM	% COMPLETE	COMPLETION DATE

I certify that the above works are currently being carried out by ourselves.

…… …… ……

Title Signature Date

SCHEDULE OF MAJOR ITEMS OF CONTRACTOR'S EQUIPMENT PROPOSED FOR CARRYING OUT THE WORKS

ITEM OF EQUIPMENT	DESCRIPTION, MAKE AND AGE (Years)	CONDITION (New, good, poor) and number available	OWNED, LEASED (From whom?), or to be purchased (From whom?)

DETAILS OF LITIGATION OR ARBITRATION PROCEEDINGS IN WHICH THE TENDERER HAS BEEN INVOLVED AS ONE OF THE PARTIES IN THE LAST 5 YEARS

1. .....

2. .....

3. .....

4. .....

5. .....

6. .....

7. .....

8. .....

9. .....

10. .....

MECHANICAL INSTALLATION WORKS

VOLUME 3

MECHANICAL INSTALLATION WORKS
for

THE PROPOSED CONSTRUCTION OF SEED STORAGE FACILITY FOR KENYA FORESTRY RESERCH INSTITUTE – LONDIANI.

SPECIFICATIONS AND BILLS OF QUANTITIES

FOR

SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING

OF

COLD STORAGE, SANITARY FITTINGS, LABORATORY INSTALLATION, WATER STORAGE & RETICULATION AND

PLUMBING & DRAINAGE WORKS.

SECTION A

GENERAL AND PARTICULAR SPECIFICATIONS FOR MECHANICAL WORKS

GENERAL MECHANICAL SPECIFICATION

i. General

This section specifies the general requirement for plant, equipment and materials forming part of the Sub-contract Works and shall apply except where specifically stated elsewhere in the Specification or on the Contract Drawings.

ii. Quality of Materials

All plant, equipment and materials supplied as part of the Sub-contract Works shall be new and of first class commercial quality, shall be free from defects and imperfections and where indicated shall be of grades and classifications designated herein.

All products or materials not manufactured by the Sub-contractor shall be products of reputable manufacturers and so far as the provisions of the Specification is concerned shall be as if they had been manufactured by the Sub-contractor.

Materials and apparatus required for the complete installation as called for by the Specification and Contract Drawings shall be supplied by the Sub-contractor unless mention is made otherwise.

Materials and apparatus supplied by others for installation and connection by the Sub-contractor shall be carefully examined on receipt. Should any defects be noted, the Sub-contractor shall immediately notify the Engineer.

Defective equipment or that damaged in the course of installation or tests shall be replaced as required to the approval of the Engineer.

iii. Regulations and Standards

The Sub-contract Works shall comply with the current editions of the following:

a) The Kenya Government Regulations.

b) The United Kingdom Institution of Electrical Engineers (IEE) Regulations for the Electrical Equipment of Buildings.

c. The United Kingdom Chartered Institute of Building Services Engineers (CIBSE) Guides.

d) British Standard and Codes of Practice as published by the British Standards Institution (BSI)

e) The Local Council By-laws.

f) The Electricity Supply Authority By-laws.

g) Local Authority By-laws.

h) The Kenya Building Code Regulations.

i) The Kenya Bureau of Standards

iv. **Electrical Requirements**

Plant and equipment supplied under this Sub-contract shall be complete with all necessary motor starters, control boards, and other control apparatus. Where control panels incorporating several starters are supplied they shall be complete with a main isolator.

The supply power up to and including local isolators shall be provided and installed by the Electrical Sub-contractor. All other wiring and connections to equipment shall form part of this Sub-contract and be the responsibility of the Sub-contractor.

The Sub-contractor shall supply three copies of all schematic, cabling and wiring diagrams for the Engineer's approval.

The starting current of all electric motors and equipment shall not exceed the maximum permissible starting currents described in the Kenya Power and Lighting Company (KPLC) By-laws.

All electrical plant and equipment supplied by the Sub-contractor shall be rated for the supply voltage and frequency obtained in Kenya, that is 415 Volts, 50Hz, 3-Phase or 240Volts, 50Hz, 1-phase.

Any equipment that is not rated for the above voltages and frequencies shall be rejected by the Engineer.

v. **Transport and Storage**

All plant and equipment shall, during transportation be suitably packed, crated and protected to minimise the possibility of damage and to prevent corrosion or other deterioration.

On arrival at site all plant and equipment shall be examined and any damage to parts and protective priming coats made good before storage or installation.

Adequate measures shall be taken by the Sub-contractor to ensure that plant and equipment do not suffer any deterioration during storage.
Prior to installation all piping and equipment shall be thoroughly cleaned.

If, in the opinion of the Engineer any equipment has deteriorated or been damaged to such an extent that it is not suitable for installation, the Sub-contractor shall replace this equipment at his own cost.

vi. **Site Supervision**

The Sub-contractor shall ensure that there is an English-speaking supervisor on the site at all times during normal working hours.

vii. **Installation**

Installation of all special plant and equipment shall be carried out by the Sub-contractor under adequate supervision from skilled staff provided by the plant and equipment manufacturer or his appointed agent in accordance with the best standards of modern practice and to the relevant regulations and standards described under Clause 2.03 of this Section.

viii. **Testing**

a. General

The Sub-contractor's attention is drawn to Part 'C' Clause 1.38 of the "Preliminaries and General Conditions".

b. Material Tests

All material for plant and equipment to be installed under this Sub-contract shall be tested, unless otherwise directed, in accordance with the relevant B.S Specification concerned.

For materials where no B.S. Specification exists, tests are to be made in accordance with the best modern commercial methods to the approval of the Engineer, having regard to the particular type of the materials concerned.

The Sub-contractor shall prepare specimens and performance tests and analyses to demonstrate conformance of the various materials with the applicable standards.

If stock material, which has not been specially manufactured for the plant and equipment specified is used, then the Sub-contractor shall submit satisfactory evidence to the Engineer that such materials conform to the requirements stated herein in which case tests of material may be partially or completely waived.
Certified mill test reports of plates, piping and other materials shall be deemed acceptable.

c. Manufactured Plant and Equipment – Work Tests

The rights of the Engineer relating to the inspection, examination and testing of plant and equipment during manufacture shall be applicable to the Insurance Companies or Inspection Authorities so nominated by the Engineer.

The Sub-contractor shall give two week's notice to the Engineer of the manufacturer's intention to carry out such tests and inspections.

The Engineer or his representative shall be entitled to witness such tests and inspections. The cost of such tests and inspections shall be borne by the Sub-contractor.
Six copies of all test and inspection certificates and performance graphs shall be submitted to the Engineer for his approval as soon as possible after the completion of such tests and inspections.

Plant and equipment which is shipped before the relevant test certificate has been approved by the Engineer shall be shipped at the Sub-contractor's own risk and should the test and inspection certificates not be approved, new tests may be ordered by the Engineer at the Sub-contractor's expense.

d. Pressure Testing

All pipework installations shall be pressure tested in accordance with the requirements of the various sections of this Specification. The installations may be tested in sections to suit the progress of the works but all tests must be carried out before the work is buried or concealed behind building finishes. All tests must be witnessed by the Engineer or his representative and the Sub-contractor shall give 48 hours notice to the Engineer of his intention to carry out such tests.
Any pipework that is buried or concealed before witnessed pressure tests have been carried out shall be exposed at the expense of the Sub-contractor and the specified tests shall then be applied.

The Sub-contractor shall prepare test certificates for signature by the Engineer and shall keep a progressive and up-to-date record of the section of the work that has been tested.

ix. **Colour Coding**

Unless stated otherwise in the Particular Specification all pipework shall be colour coded in accordance with the latest edition of B.S 1710 and to the approval of the Engineer or Architect.

x. **Welding**

a. Preparation

Joints to be made by welding shall be accurately cut to size with edges sheared, flame cut or machined to suit the required type of joint. The prepared surface shall be free from all visible defects such as lamination, surface imperfection due to shearing or flame cutting operation, etc., and shall be free from rust scale, grease and other foreign matter.

b. Method

All welding shall be carried out by the electric arc processing using covered electrodes in accordance with B.S. 639.
Gas welding may be employed in certain circumstances provided that prior approval is obtained from the Engineer.

c. Welding Code and Construction

All welded joints shall be carried out in accordance with the following Specifications:

i. Pipe Welding

All pipe welds shall be carried out in accordance with the requirements of B.S.806.

ii. General Welding

All welding of mild steel components other than pipework shall comply with the general requirements of B.S. 1856.

d. Welders Qualifications

Any welder employed on this Sub-contractor shall have passed the trade tests as laid down by the Government of Kenya.

The Engineer may require to see the appropriate certificate obtained by any welder and should it be proved that the welder does not have the necessary qualifications the Engineer may instruct the Sub- contractor to replace him by a qualified welder.

SECTION B

PARTICULAR SPECIFICATIONS FOR PLUMBING AND DRAINAGE

PARTICULAR SPECIFICATIONS FOR PLUMBING AND DRAINAGE

1.0 INTRODUCTION

This section covers the general requirements for plant, equipment and materials forming for the plumbing and drainage installations.

2.0 MATERIALS AND STANDARDS

2.0.1 Pipework and Fittings

Pipework materials are to be used shall be as follows:

a) Galvanized Steel Pipework

Galvanized steel pipe work up to 65mm nominal bore shall be manufactured in accordance with KS06.366:1982 or B.S. 1387 Medium Grade, with tapered pipe threads in accordance with B.S. 21. All fittings shall be malleable iron and manufactured in accordance with KS06-885:1995 or B.S. 143.

Pipe joints shall be screwed and socketed and sufficient coupling unions shall be allowed so that fittings can be disconnected without cutting the pipe. Running nipples and long screws shall not be permitted unless exceptionally approved by the Engineer.

Galvanized steel pipe work, 80mm nominal bore up to 150mm nominal bore shall be manufactured to comply in all respects with the specification for 65mm pipe, except that screwed and bolted flanges shall replace unions and couplings for the jointing of pipes to valves and other items of plant. All flanges shall comply with the requirements of B.S. 10 to the relevant classifications contained hereinafter under Section 'C' of the Specification.

Galvanizing shall be carried out in accordance with the requirements of B.S. 1387 and B.S. 143 respectively.

b) Copper Tubing

All copper tubing shall be as manufactured in accordance with B.S. 2871 from C.160 'Phosphorous De-Oxidized Non-Arsenical Copper' in accordance with B.S. 1172.

Pipe joints shall be made with soldered capillary fittings and connections to equipment shall be with compression fittings as manufactured in accordance with B.S. 864.
Short copper connection tubes between galvanized pipe work and sanitary fitments shall not be used because of the risk of galvanic action.

If, as may occur in certain circumstances, it is not possible to make the connection in any way than the use of copper tubing, then a brass straight connector shall be positioned between the galvanized pipe and the copper tube in order to prevent direct contact.

c) Poly-vinyl Chloride (P.V.C) pipes and fittings

The contractor shall supply and fix PVC soil pipes and fittings as indicated on the Designs and Schedules.

Pipes and fittings shall be in accordance with relevant British Standards, including B.S. 4514 and fixed to the manufacturer's instructions and B.S. 5572.

The soil system shall incorporate synthetic rubber gaskets as provided by the manufacturer whose fixing instructions shall be strictly adhere to.

Connections to WC pans shall be effected by the use of a WC connector, gasket and cover, fixed to suit pan outlet. Suitable supporting brackets and pipe clips shall be provided at maximum of one metre centres.

The contractor shall be responsible for the joint into the Gully Trap on Drain as indicated on the Drawings.

2.0.2 Valves

a) Draw-off Taps and Stop Valves (Up to 50mm Nominal Bore)

Draw-off taps and valves up to 50mm nominal bore, unless otherwise stated or specified for attachment or connection to sanitary fitment shall be manufactured in accordance with the requirements of B.S.1010.

b) Gate Valves

All gate valves 80mm nominal bore and above, other than those required for fitting to buried water mains shall be of cast iron construction, in accordance with the requirements of B.S. 3464. All gate valves required for fitting to buried water mains shall be of cast iron construction in accordance with the requirements of B.S.1218.

All gate valves up to and including 65mm nominal bore shall be of bronze construction in accordance with the requirements of B.S. 1952.

The pressure classification of all valves shall depend upon the pressure conditions pertaining to the site of works.

c) Globe Valves

All globe valves up to and including 65mm nominal bore shall be of bronze construction in accordance with the requirements of B.S.3061 or KS06-885:1995.

The pressure classification of all globe valves shall depend upon the pressure conditions pertaining to the site of works.

2.0.3 Waste Fitment Traps

a) Standard and Deep Seal P & S Traps

Where standard or deep seal traps are specified they shall be manufactured in suitable non-ferrous materials in accordance with the full requirements of B.S. 1184.

In certain circumstances, cast iron traps may be required for cast iron baths and in these instances bath traps shall be provided which are manufactured in accordance with the full requirements of B.S.1291.

2.0.4 Pipe Supports

a) Introduction

The contractor shall supply and install all steelwork forming part of the pipe support assemblies and shall be responsible for making good damage to builder's work associated with the pipe support installation.

The contractor shall submit all his proposals for pipe supports to the Engineer for approval before any erection works commence.

b) Steel and Copper Pipes and Tubes

Pipe runs shall be secured by clips connected to pipe angers, wall brackets, or trapeze type supports.

'U' bolts shall not be used as a substitute for pipe clips without the prior approval of the Engineer.

An approximate guide to the maximum permissible supports spacing in meters for steel and

copper pipe and tube is given in the following table for horizontal runs.

Size Nominal Bores	Copper Tube to B.S. 659	Steel Tube to B.S. 1387
15mm	1.25m	2.0m
20mm	2.0m	2.5m
25mm	2.0m	2.5m
32mm	2.5m	3.0m
40mm	2.5m	3.0m
50mm	2.5m	3.0m
65mm	3.0m	3.5m
80mm	3.0m	3.5m
100mm	3.0m	4.0m
125mm	3.0m	4.5m
150mm	3.5m	4.5m

The support spacing for vertical runs shall not exceed one and a half times the distances given for horizontal runs.

2.0.5 Sanitary Appliances

All sanitary appliances supplied and installed as part of the works shall comply with the general requirements of B.S. Code of Practice 305 and the particular requirements of the latest B.S. Specifications.

2.0.6 Pipe Sleeves

Main runs of pipework are to be fitted with sleeves where they pass through walls and floors. Generally the sleeves shall be of P.V.C. except where they pass through the structure, where they shall be mild steel. The sleeves shall have 6mm – 12mm clearance all around the pipe or for insulated pipe-work all around the installation. The sleeve will then be packed with slag wool or similar.

3.0 INSTALLATION

3.0.1 Introduction

Installation of all pipework, valves, fittings and equipment shall be carried out under adequate supervision from skilled staff to the relevant codes and standards as specified herein. The contractor shall be responsible to for ensuring that all builders work associated with his piping installation is carried out in a satisfactory manner to the approval of the Engineer.

3.0.2 Above Ground Installation

a) Water Services

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.

Where falls are not shown or stated elsewhere in the Specification, pipework shall be installed parallel to the lines of the buildings and as close to the walls, ceilings, columns, etc., as is practicable.

All water systems shall be provided with sufficient drain points and automatic air vents 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 position as to be difficult to reach from a small step ladder, extension spindles with floor or wall pedestals shall be provided.

Screwed piping shall be installed with sufficient number of unions to facilitate easy removal of valves and fittings, and to enable alterations of pipework to be carried out without the need to cut the pipe.

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

All screwed joints to piping and fittings shall be made with P.T.F.E. tape.
The test pressure shall be maintained by the pump for about one hour and if there is any leakage, it shall be measured by the quantity of water pumped into the main in that time. A general leakage of 4.5 litres per 25mm of diameter, per 1.6 kilometers per 24 hours per 30 meters' head, may be considered reasonable but any visible individual leak shall be repaired.

b) <u>Sanitary Services</u>

Soil, waste and vent pipe system shall be installed in accordance with the best standard of modern practice as described in B.S. 5572 to the approval of the Engineer.

The contractor shall be responsible for ensuring that all ground waste fittings are discharged to a gully trap before passing to the sewer via a manhole.

All necessary rodding and inspection facilities within the draining system in positions where easy accessibility is available.

Where a branch requires rodding facilities in a position to which normal access is unobtainable, then that branch shall be extended so as to provide a suitable purpose made rodding eye
in the nearest adjacent wall or floor to which easy access is available.

The vent stacks shall terminate above roof level and where stack passes through roof, a weather skirt shall be provided. The contractor shall be responsible for sealing the roof after installation of the stacks.

The open end of each stack shall be fitted with a plastic coated or galvanized steel wire guard.
Access for rodding and testing shall be provided at the foot of each stack.

c) <u>Sanitary Appliances</u>

All sanitary appliances associated with the works shall be installed in accordance with the best standard of modern practice as described in C.P. 305 to the approval of the Engineer

4.0 TESTING AND INSPECTION

4.0.1 Site Tests – Pipework Systems

a) Above Ground Internal Water Services Installation

All water service pipe system installed above ground shall be tested hydraulically for a period of one hour to not less than one and half times to design working pressure.

If preferred, testing the pipelines in sections may be done. Any such section found to be satisfactory need not be the subject of a further test when system has been completed, unless specifically requested by the Engineer.

During the test, each branch and joint shall be examined carefully for leaks and any defects revealed shall be made good by the Sub-contractor and the section re-tested.

All necessary precautions to be taken to prevent damage occurring to special valves and fittings during the tests. Any item damaged shall be repaired or replaced at the Sub-contractor's expenses.

b) Above Ground Soil Waste and Ventilation System

All soil, waste and ventilating pipe system forming part of the above ground installation, shall be given appropriate test procedures as described in B.S. 5572, 1972.or KS02-254:1986

Smoke tests on above ground soil, waste and ventilating pipe system shall not be permitted.

Pressure tests shall be carried out before any work which is to be concealed is finally enclosed.

In all respects, tests shall comply with the requirements of B.S. 5572.

4.0.2 Site Test – Performance

Following satisfactory pressure test on the pipework system operational tests shall be carried out in accordance with the relevant B. S. Code of practice on the systems as a whole to establish that special valves, gauges, control, fittings, equipment and plant are functioning correctly to the satisfaction of the Engineer.

All hot water pipework shall be installed with pre-formed fibre glass lagging to a thickness of 25mm where the pipe runs above a false ceiling or in areas where the ambient temperature is higher than normal with the result that pipe "sweating", due to condensation will cause nuisance.

All lagged pipes which run in a visible position after erection shall be given a canvas cover and prepared for painting as follows:

i) Apply a coating of suitable filler until the canvas weave disappears and allow to dry.
ii) Apply two coats of an approved paint and finish in suitable gloss enamel to colors
iii) Approved by the Engineer.

All lagging for cold and hot water pipes erected in crawlways, ducts and above false ceiling which after erection are not visible from the corridors of rooms, shall be covered with a reinforced aluminium foil finish banded in colours to be approved by the Engineer.

In all respects, unless otherwise stated, the hot and cold water installation shall be carried out in accordance with the best standard of modern practice and described in C.P.342 and C.P.310 respectively to the approval of the Engineer.

The test pressure shall be applied by means of a manually operated test pump or, in the case of long main or mains of large diameter, by a power-driven test pump which shall not be left unattended. In either case precaution shall be taken to ensure that the required pressure is not exceeded.

Pressure gauges should be recalibrated before the tests.

The contractor shall be deemed to have included in his price for all test pumps, and other equipment required under this specification.

The test pressure shall be one and a half times the maximum working pressure except where a pipe is manufactured from a material for which the relevant B.S. specification designates a maximum test pressure.

5.0 STERILISATION OF COLD-WATER SYSTEM

All water distribution system shall be thoroughly sterilized and flushed out after the completion of all tests and before being fully commissioned for handover.

The sterilisation procedures shall be carried out in accordance with the requirements of B.S. Code of Practice 301, Clause 409 and to the approval of the Engineer.

SECTION C:

PARTICULAR SPECIFICATIONS FOR COLD STORAGE REFRIGERATION EQUIPMENT

PARTICULAR SPECIFICATIONS FOR COLD STORAGE REFRIGERATION EQUIPMENT

1.0 SCOPE OF WORK

The work to be carried out comprises the supply, delivery, installation, testing and commissioning of a cold room and freezer room refrigeration equipment, a cold room doors, wall, ceiling and floor insulation and control panel with auxiliary equipment and wall finishes in aluminium sheet.

2.0 DESIGN CONDITIONS

Mean ambient temperature: 28 ^{0}C Storage temperature:0 -5.0 ^{O}C (for cold room) and 0 –(-5) ^{O}C(for freezer room)
Storage humidity (minimum): 50% Evaporator Cooling load:2.5 Kw Condenser cooling load 3 kW for coldroom and 3 Kw
Condenser cooling load 4 kW for freezer room

3.0 THE COLD ROOM

The external dimensions of the desired is cold room are 3m x 4 m x 3 m high. This shall have mechanically applied vapor barrier and insulation on a concrete floor slab and roof and block walls.

4.0 VAPOUR BARRIER & WATER PROOFING

Before the application of the insulation to the structure a vapour barrier shall be applied to the entire internal surface. This shall consist of an even layer of Flinkote type 3 or equalapplied to manufactures instructions. The top surface of the floor insulation shall be water proofed using an asphalt saturated and coated vapour barrier paper of not more than 0.3perms permeance or other equal lapped at least 80mm and tacked in place.

The vapor seal must be approved by the Engineer before insulation work is commenced.

5.0 INSULATION AND FINAL WALL FINISHES

Selection and specification of the cold storage insulation material:

Polyurethane **(PU)** sandwich panel with a density of **40kg/m^3** , thermal conductivity of **0.022W/mK** , and fire proof authenticity of class **B**, with a galvanized aluminum metal cover **0.8mm** thick with the entire panel thickness of **100mm** thick and insulated as described above.

Care must be taken to avoid breaking the vapor seal when fixing the insulation. Two morecoats of vapour seal shall then be applied after application of insulation. Hardwood battens shall be provided at regular intervals between insulation. Aluminum sheet (SWG 20) as specified on the drawing shall then be applied and secured on the hardwood. The contractor carrying out builder's works shall then finish off the floor with 75 mm reinforced concrete and plaster under supervision of the contractor carrying out cold room works.

6.0 INSULATED DOOR

The door and frame shall be fabricated from heavy seasoned timber and insulated with two layers of 50mm thick polystyrene sand-witched between 10mm thick seasoned woodstrips. It shall have a clear height of 2.5 m and be two each of 875 mm wide being of thesliding type in opening. The door shall be completed with sufficient gaskets to ensure an airtight seal. The door shall be fitted with automatic plunger type switches for operating thefan motors and interior lights such that when it is open, the light shall go on and the fan shallstop, and when it is closed, the lights shall go off and the fan shall start.

The door shall be such that it can be padlocked from outside but with an inside release such that it can be opened from inside even when padlocked. All metal parts on the doorshall be chrome plated.

7.0 EVAPORATOR

The evaporator shall consist of a cooling coil, air-circulating fan, fan guard, defrost electric heater element and a thermostatic expansion valve. The valve shall be pressure equalized and manually adjustable. A timer unit shall be mounted in the control panel to control both the de-frosting intervals and defrosting period – both of which shall be variable. Theevaporator shall be of cooling load capacity 2.5 kW. It shall be ceiling type unit with a drip tray fitted with a drain pipe to the outside of the building. The unit shall be as KUBA SGA 71or equal.

8.0 CONDENSING UNIT

The condensing unit shall be of capacity to cope with the evaporator-cooling load while using refrigerant R22 under specified conditions. The unit shall be air-cooled semi hermeticwith automatic capacity control for evaporator demand.

It shall be provided with suitable anti-vibration mountings and an initial oil change in thecompressor. The unit shall be complete with compressor, electric motor, air-cooled condenser of non-ferrous construction, liquid receiver, all mounted on a common base. The unit shall be as BITZER LH33/2HC-22 or equal and shall be mounted in the adjoiningcompressor space and for which the contractor shall provide for its caging according to instructions that will be issued by the Architect and the Engineer (in quoting for the eachcondensing unit the contractor to include a sum for the cage).

9.0 REFRIGERATION PIPEWORK

Pipework shall be approved copper tubing and fitting and shall be properly fixed in conformity with 'TRANE REFRIGERATION MANUAL'. The suction line shall be insulated with atleast 25mm thickness of Armaflex or other approved material, which shall not have insulating properties inferior to those of cork. Each condensing unit shall be at an averagedistance of meters from its evaporator unit.

10. REFRIGERATION COMPONENTS

The system shall be provided with the following components all similar to or equal to those manufactured by DANFOSS

- Filter drier
- Sight glass with moisture indicator
- Solenoid valve
- HP/LP cut out
- Suction & delivery gauges
- Room thermostat
- 100mm diameter surface mounted dial thermometer in degree Celsius

11. CONTROL PANEL

The control panel shall be fabricated from mild steel sheet of minimum SWG18 with a hinged door and then powder coated after manufacture. It shall be provided with an integral lock. It shall be complete with;

- Isolator fitted on the door
- Controlling thermostat with temp rang from -100C to 300C
- 80mm dial thermometer with temp rang from -100C to 300C
- Contactors for defrosting Coils
- Motor starters &current overload relays
- MCBs
- Phase failure relay with over and under voltage protection
- Timer switch for defrost control
- Push buttons for start and stop
- Audible and visual high temperature alarm with manual reset
- The panel shall also have green light running indicators, red "door open" light and equipment circuit trip lights

12.0 ELECTRICAL INSTALLATION

The electrical sub-contractor shall be responsible for providing power to the control panel and for providing a local Isolator and connecting power to it. The cold room contractor shall be responsible for the final connections to the above equipment, all control wiring and for all wiring within the control panel.

13.0 PALLET AND PALLET TROLLEY

The contractor shall supply and arrange the pallet boxes in each cold room each with thefollowing dimensions 1800 mm (long) x 1200 mm (wide) and a depth of 900 mm in the cold room as shown on the drawing. Each pallet shall be as described in the bills and suitablefor pallet trolley arrangement for material handling.

The contractor shall supply a 3-ton capacity pallet trolley as described in the bills of quantity.

14.0 TESTING AND COMMISSIONING

Before insulation of the suction pipe the refrigeration system shall be tested for pressure and leaks using the combined pressure and leaks testing method. The refrigeration system shallbe charged with R22 refrigerant and entire system raised to test pressure using nitrogen or other inert gas. The test pressure shall be twice the working pressure for the system.

Leaks shall be checked using soap bubble followed by using of electronic leak detector. After system is proved leak proof, it shall be maintained under test pressure for 24 hours. Ifat the end of this time the gauge pressure has fallen, the complete system shall be re- tested. After the successful completion of the test, the system shall be evacuated using vacuum for 24 hours. If there is loss of vacuum the system shall be dehydrated again andleft under vacuum for a further 24 hrs. until the system is effectively dehydrated.

After this the system shall be charged with the correct type and quantity of the refrigerant. The system shall then be set to work and adjusted to ensure that it operates correctly anddesign conditions are archived. It shall be left to operate for 72 hrs. and room temperaturesrecorded for this period using an automatic room temperature sensor/recorder.

The compressor shall be provided with identification plates stating the type of refrigerantused and the quantity required for the system.

15. TESTING AND COMMISSIONING OF THE COLD ROOM

The cold room shall be tested if it is air tight.

It shall be pressurized or evacuated slightly at a pressure difference of 187 Pa and the time it takes for it to reduce to 125 Pa.

A suitably accurate manometer (that shall be retained by the project engineer) shall beused to conduct the test. It should be noted that the pressure difference to atmosphereduring the test shall not exceed 250 Pa.

The test of the room to hold pressure shall be a duration of 7 minute

SECTION D:

PARTICULAR SPECIFICATION FOR VULCATHENE LABORATORY FITTINGS AND CHEMICAL WASTE DRAINAGE SYSTEM

Particular Specification for Vulcathene Chemical Waste Drainage System

1. Vulcathene Enfusion System Overview

Under normal laboratory conditions the Vulcathene Mechanical drainage system is more than sufficient. Where a fused joint is preferred - for example, where pipe is to be buried or run overhead in ceiling voids or in drainage stacks - the Vulcathene Enfusion electro fusion range of chemical waste fittings is recommended.

Vulcathene Enfusion fitting sockets are molded with an integral resistance wire in place. Jointing is completed by energizing the resistance wire via a microprocessor controlled Enfusion Control Unit. Vulcathene Enfusion is compatible with Vulcathene Mechanical offering total versatility to the designer of chemical waste drainage systems.

- Design flexibility
- Easy to install
- Multiple jointing
- Controlled fusion
- Voltage sensing
- Fusion time adjustment
- Self-diagnostic unit

Enfusion has proven over time that it produces the optimum level of performance where it matters most - at the joint interface. It offers unprecedented control of jointing - controlled fit, controlled temperature and controlled time.

2. Vulcathene Mechanical System Overview

The Vulcathene Mechanical system is a complete purpose-designed chemical resistant plumbing system which embraces laboratory bench items such as wastes, sinks and drip cups, anti-siphon traps, expansion joints plus a comprehensive range of pipe fittings from 38mm to 102mm. Mechanical Jointing, with its unique nut & olive method, is simple & fast to execute and joints can be easily made and remade without affecting the joint's efficiency, allowing system changes to be made at reduced cost. Simple, purpose designed tools ensure correct installation.

• Purpose designed and engineered system
• Simple, fast jointing method
• Demountable joints
• Anti-siphon traps
• Borosilicate glass base traps
• British Board of Agrément approved
• Co-polymer based material High chemical resistance rating; abrasion resistant; high impact strength; weather resistant; wide temperature capability
• Unsurpassed record of success in drainage applications

3. Standards & Quality

Vulcathene products are manufactured in accordance with BS EN ISO 9001. Products are subjected to a range of checks and tests. Detailed records are kept for dimensional and performance tests for each production batch. Each batch is given a unique identification number, which is reproduced on every fitting giving complete traceability.

Vulcathene pipes and fittings are manufactured within an environmental management system which operates in accordance with the requirements of ISO 14001. Whilst there is no specific British or CEN Standard for the performance of a chemical waste drainage system, the products manufactured for the Vulcathene system are covered by Agreement Certificates which ensures their fitness for purpose.

4. British Board of Agreement Specification Clauses

4.1 Material and Manufacture

Manufactured from co-polymer polypropylene with 3% carbon black ultra violet stabilizer. All fittings injection molded from virgin grade polypropylene. All pipes to be extruded from virgin grade polypropylene.

4.2 Mechanical System

All mechanical joints to be demountable compression. All joints incorporate a positive seal utilizing a 'tongued' olive located in a groove cut into the external wall on the pipe. This combines system security with the ability to disassemble the system if required.

4.3 Traps

All traps should be of the anti-symphonic type, preventing suction developing within the system which could prevent effective drainage of chemicals. Vulcathene traps with a Borosilicate glass base must be used with particularly strong chemical solutions and when large amounts of organic solvents are used.

Where the W691 Dilution Recovery Trap is used, the underside of the trap must be supported to prevent undue strain on the pipework system.

5. The System

Vulcathene is a proven chemical resistant pipework system installed in laboratories in schools, universities, hospitals and industrial facilities worldwide over a 60-year period. Vulcathene is proven with all chemical combinations emptied into it including acids, alkalis, solvents, detergents, blood samples, retro viruses and radioactive wastes.

Vulcathene is a complete laboratory system including waste outlets, sinks, drip cups, anti-siphon traps, dilution recovery traps and a comprehensive range of pipe and fittings in sizes 38mm to 152mm.

6. Vulcathene Material Properties

Manufactured from co-polymer polypropylene with 3% carbon black ultra-violet stabiliser. Vulcathene has very high resistance to chemical attack and is well suited to the conveyance of aggressive chemicals, and other liquids as used in chemical plants and laboratory waste.

The performance specification is based on the need to supply a waste system which has a high chemical resistance rating in respect of the corrosive materials which it has to convey. Good tensile strength, ductility, abrasion resistance, high impact strength, weather resistance, and is stable over the range of temperatures normally encountered in the environment in which it is used.

Vulcathene is resistant to many concentrated acids and alkalis and some organic solvents. Vulcathene also has a good abrasion resistance throughout its operational temperature range of between -20°C and +100°C.

With a smooth bore, it is lightweight with a specific gravity of 0.905. It has high impact strength, which minimises damage during and after installation.

The full specification to which Vulcathene pipe and fittings are manufactured is detailed below.

7. **Property Test Method Unit**

Melt flow index (MFI) 230°C/2.16 kg Granules 6.5

Density (mean) kg/m3 9.5

Tensile yield stress ISO 527 MPa 27.0 ASTM D 638M kg/cm2 295 (50mm/min)

Flexural modulus ISO 178 GPa 1.15 ASTM D 790 kg/cm2 14100

Izod impact strength ISO 180 kj/m2 23°C 7.0 (0.25mm notch radius) 0°C 4.5 -20°C 3.0 -40°C -

Rockwell hardness ISO 2039/2, ASTM D 785 R scale 90

Vicat softening temperature ISO 306A (10 N force) BS 2782; 102 A °C 147

Heat distortion temperature ISO 75/A and /B A - 1.8 MPa (18.6kg/cm2) ASTM D 648-A-B °C 55 B - 0.45 MPa (4.6kg/cm2) °C 90

Flammability ISO 3795 FMVSS 302 Burning rate (2mm thickness) mm/min 38

8. Making the Enfusion Joint

8.1 The Enfusion Joint

Enfusion fittings are manufactured with an integral resistance wire. The wire is electrically heated by means of a microprocessor controlled Enfusion Control Unit. This results in fusion and bonding of the pipe to the fitting.Jointing is achieved within minutes.

The Enfusion joint achieves the optimum level of performance where it matters most – at the joint interface. **Controlled fit, controlled temperature and controlled time**. All of this is achieved by means of the Enfusion Control Unit, which ensures proper electrical connections, joint timing and input/output current levels. The combination of these features provides both simplicity of jointing and perfect control.

The integral resistance wire is manufactured from a heavy gauge nickel/chrome alloy which allows for uniform electrical resistance and heating, while offering excellent chemical resistance.

The overall result is a state-of-the-art jointing method which offers simplicity and quickness

8.2 Making the Enfusion Joint

Before making the Enfusion Joint, it is important to check that the power source is providing 104 to 126 volts at 45 to 65 cycles with 16amp capacity. The Enfusion controller provides for reasonable and normal power variation, but generators in particular should be checked to ensure that rated output is being provided.

Preparation

1. Cut the pipe square and remove all burrs and loose material.

Use a tube cutter with a wheel designed for use on plastic pipe. If a saw and mitre box combination is used, make certain to remove all burrs. DO NOT CHAMFER THE CUT.

2. Using a pipe scraper, scrape the end of the pipe equivalent to the depth of the socket plus 50%.

Removal of the slick or 'skin' on the surface of the pipe is imperative to obtain a good fusion joint. Once prepared DO NOT handle this area or allow it to get dirty.

3. Insert the pipe all the way to the stop at the bottom of the socket.

4. Decide whether the joint will be welded singly or in series.

If multiple joints are to be made, refer to the table on the next page which indicates the maximum number of joints relative to the pipe size.

5. Loosely fit the appropriate sized clamp(s) over the hub(s) of the socket(s) to be joined and position flush with the socket opening. It is imperative to ensure correct positioning of clamps.

6. Tighten the clamp(s) around the hub(s) of the socket(s).

It is important that the clamp(s) is/are tightened sufficiently to stop pipe rotation in the socket. Do not overtighten.

7. Before using the Enfusion Control Unit ALL cables MUST be unwound from the protective frame or removed from the Pelicase if using the hand-held unit.

8. Turn the Enfusion Control Unit on and it will self-test.

9. Follow the instruction on the display to 'Connect Output Lead'.

If using a single joint, connect the output leads to one joint. If multiple joints, utilise the link leads as required.

10. **Hand-held Unit:** Press START button to begin welding. *The Enfusion Control Unit will display the temperature and the welding time.*

11. Old style Unit: Use select button & select 3" or above for all sizes; then press START button to begin welding.

11. When completed, the Enfusion Control Unit will emit an audible alarm and display the message 'Disconnect Output Lead'. *During this period the Enfusion Control Unit will count down to zero.*

12. Wait 30 seconds to allow the joints to cool, before gently disconnecting leads from the joints. *The Enfusion Control Unit will now reset, ready for the next operation.*

13. Leave the joint undisturbed for at least 5 minutes before removing clamp(s).

9. **Supporting Vulcathene Pipes**

Vulcathene pipe does not typically require continuous support when used for horizontal runs at room temperatures. Vulcathene pipe clips should be fixed at the following recommended centres:

Nominal I.D. 38mm 51mm 76mm 102mm 152mm

Horizontal Fixing Centres 1.22m 1.37m 1.52m 1.83m 1.83m

Vertical Fixing Centres 1.5m 1.5m 1.5m 1.5m 1.5m

Vulcathene pipe clips are snap-on and retain the pipe securely whilst still allowing lateral movement of the pipe caused by fluctuations in thermal conditions.

Note: (i) When 76mm or 102mm pipe is installed in vertical runs of some length, strain may be caused by thermal movement. In such conditions metal straps should be used to retain the pipe.

(ii) Horizontal pipe runs, where sustained temperatures in excess of 40°C (104°F) are expected, should have continuous support using Vulcathene galvanised support channel.

(iii) Where Vulcathene pipework is to be suspended, metal hangers are recommended.

10. **Buried Pipes**

Generally, trenches should not be less than 1m deep. The trench should be straight sided and as narrow as possible to allow proper consolidation. The trench bottom should be level and free from rock, debris and sharp objects.

A 100mm deep bed of pea gravel should be laid in the bottom of the trench and backfilling, with similar material, should continue until a 100mm layer over the pipe is achieved.

Pipes may be jointed in the trench but if joined above ground should be allowed to cool sufficiently.

11. **Reducing Pipe Sizes**

Apart from the 51mm x 38mm fitting which is produced as a one piece moulding, all reducing sweep tees in the Mechanical range are made by adding a W39 series reducing coupler to the branch of a W20 series equal sweep tee. Enfusion sweep tees are one piece moulded items.

12. **Thermal Movement and Vulcathene Pipework**

To overcome the problem of expansion and contraction from changing temperatures, Vulcathene Stress Relief Units (SRUs) eliminate the stresses and strains caused by thermal movement.
When installing an SRU, care should be taken to ensure an accurate Linear 'thrust and pull' movement. Any pipe clip used should not grip the pipe tightly, but should allow the pipe to slide freely without any tendency to buckle. The housing of the SRU should always be firmly anchored to allow the sliding member to accept all movement.

Vulcathene SRUs move very easily at about 5psi, the total movement, for all sizes, being approximately +/- 25mm (1"). The co-efficient of expansion for Vulcathene plumbing is 1.4mm per metre per 10°C.

On Vulcathene stacks, an SRU should be installed at every floor level where there is a stack connection. If there is no stack connection one SRU should be installed everytwo floors.

SRUs can be installed on horizontal pipes where there are insufficient changes in direction to accommodate thermal movement, eg. on long runs or where hot water is being conveyed.

13. **Installing Vulcathene Thermal Stress Relief Units**

All Vulcathene thermal SRUs are directional to the flow of the liquid. On 38mm and 51mm SRUs the tail end pipe should be pushed fully home and its position marked. It should then be withdrawn 38mm.

The 76mm, 102mm & 152mm are spigot ended for either mechanical or electrofusion jointing and have an open chamber fitted with a dust cap. The dust cap is prised off and slid up the pipe; the pipe is chamfered, lubricated and then slid into the chamber of the SRU until it hits the stop. The pipe should then be marked to show the limit of travel, then withdrawn approx. 25-38mm. The dust cap is then firmly replaced.

Note: 76, 102 + 152mm SRU's have built-in O-Ring seals.

The body must be firmly held still to allow the SRU to function properly. SRUs should be anchored with a metal clamp except the 38mm which has a moulded fixing clip. Multiple fix points may be required where necessary.

14. **System Testing**

The system should be inspected for any possible leaks in accordance with BS EN 12056. Air should be pumped into the system through a branch of a tee piece until a pressure equal to 38mm water gauge is

achieved. The inlet valve should then be closed and the system should maintain the pressure for a minimum of three minutes.

15. **System Maintenance**

The W561 and W571 anti-siphon bottle traps and the W681 anti-siphon dilution recovery traps have sumps that can be removed for cleaning by unscrewing. The chamber of the W691 anti-siphon dilution recovery trap is removed by unscrewing the flange assembly.
The W612 dilution recovery trap is cleaned by removing the dip tubes and carefully flushing the interior of the dilution chamber. The new 910G is supplied with a removable lid & gasket seal, both held in place by a stainless steel clamp which can be easily removed for access & maintenance. The W90/L90 series access pipes should be fitted into the pipework system as required to provide sufficient and suitable access for testing and maintenance.

16. **Installing Sinks, Drip Cups and Waste Assemblies**

When 504 wastes are used with a plastic or thin walled vessel a Butyl Rubber Gasket should be fitted between the backnut and underside of the sink. All sinks, drip cups and slotted waste assemblies should be bedded with a suitable sealant. eg. Dow Corning 786.

The illustration above shows a 509 overflow assembly with flexible hose to connect to the waste. The overflow bend and face-plate are set in with a suitable sealant. eg. Dow Corning 786.

The illustration above shows the slotted version of the 504 waste assembly used in conjunction with the 509 overflow assembly. The waste, overflow collar and washer are all set with a suitable sealant. eg. Dow Corning 786.
The illustrations above show the recommended method of supporting Vulcathene sinks using wooden battens screwed to the underside of the work top. Larger capacity sinks may need additional supporting metal straps in the manner shown.
It is recommended that all Vulcathene Drip Cups are secured to the work top using a timber frame
Installing Clamp Saddles Vulcathene clamp saddles enable fast and easy connection of new branch pipes to existing Vulcathene stacks without the need for special tools or equipment:

1. Position lower half of saddle onto pipe.
2. Taking care to seat the gasket seal in the branch outlet (and the anti-rotation insert into the lower part of the saddle), bolt both halves together.
3. Use a spanner to tighten; do not over-torque!
4. Drill pipe wall.

Clamp bolts should be tightened with care. Avoid overtightening. Tighten until the upper part is well compressed on the pipe & resistance to the nut screwing has become high. **Note:** 76mm saddles are supplied with 4 x bolts; 102mm saddles with 6 x bolts

17. **Connection to other Pipework**

17.1 Vulcathene Mechanical/Enfusion

Vulcathene Enfusion and Mechanical are fully compatible offering total versatility to the designer/installer of chemical waste drainage systems.

17.2 Vulcathene Polyfusion

Vulcathene's original and first thermoplastic pipework system for chemical waste has been replaced by Vulcathene Enfusion, for installations where a welded drainage system is preferred.

17.3 To connect Polyfusion to Mechanical

A W271 13/4" F.I. pipe coupler should be used when joining 38mm Vulcathene Mechanical pipe to 38mm Vulcathene Polyfusion pipe. The F.I. thread of a W271 can be screwed to the M.I. thread of a Polyfusion C130 38mm half coupler which is then socket fused to Polyfusion pipe.

The W271 may also be screwed to the outlet of any Vulcathene Polyfusion trap to provide a connection for 38mm Vulcathene Mechanical pipe.

Polyfusion pipe sizes 51mm-102mm should be treated as Mechanical, i.e. groove the pipe, place an olive in the groove, lubricate the fitting thread and tighten the nut.

17.4 To connect Polyfusion to Enfusion:

Use Vulcathene BS Table D flanges. Polyfusion and Enfusion cannot be jointed together using socket or electrofusion jointing methods due to the incompatibility of the materials used.

17.5 Other Plastic and Metal Materials

W14, W15, L14 and L15 range of pipe couplers have standard BSP parallel threads and can be screwed directly to the M.I. and F.I. ends of metal or plastic pipes.

Where a BSP connection is not possible, use Vulcathene BS Table D flanges.

17.5.1 Borosilicate Glass

Vulcathene to glass adaptors are available from 38mm to 102mm.

17.5.2 Cast Iron

Use Vulcathene BS Table D Flanges.

17.5.3Stoneware

When it is intended to insert Vulcathene pipe directly into a collar or socket of another material the following procedure should be adopted. Roughen or score the pipe end with a suitable tool - a coarse file - to provide a suitable ‘key’. Pack the socket half full with rope and follow by caulking with acid-resistant cement or a proprietary brand of sealing compound until level with the bead of the collar.

17.5.4 Flexible Couplers and Adaptors

Flexible couplers and adaptors can be used to connect Vulcathene to other pipe materials.

SECTION E

BILLS OF QUANTITIES AND SCHEDULE OF UNIT RATES

GENERAL NOTES TO TENDERERS

1. The Bills of Quantities form part of the contract documents and are to be read in conjunction with the contract drawings and general specifications of materials and works.

2. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all taxes (**including 16% VAT**).

   In accordance with Government policy, the 3% Withholding Tax **shall be deducted** from all payments made to the Tenderer, and the same shall be forwarded to the **Kenya Revenue Authority (KRA).**

3 All prices omitted from any item, section or part of the Bills of Quantities shall be deemed to have been included to another item, section or part there of.

4. The brief description of the items given in the Bills of Quantities are for the purpose of establishing a standard to which the sub-contractor shall adhere. Otherwise alternative brands of **equal** and **approved** quality will be accepted.

   Should the sub-contractor install any material not specified here in before receiving **written approva**l from the Project Manager, the sub-contractor shall remove the material in question and, **at his own cost**, install the proper material.

5. The grand total of prices in the price summary page must be carried forward to the **Form of Tender for the tender to be deemed valid**.

GENERAL NOTES TO TENDERERS

A. Notes and Sample Items for Preparing a Bill of Quantities

1. These Notes for Preparing a Bill of Quantities are intended only as information for the Procuring Entity or the person drafting the Tender Documents. Priced Bills of Quantities shall be part and parcel of the Contract Documents.

2. The objectives and purpose of the Bills of Quantities are to provide sufficient information on the specifications, descriptions and quantities of Works to be performed to enable tenders to be prepared efficiently and accurately and when a contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed. In order to attain these objectives, Works should be itemized in the Bill of Quantities insufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and clear as possible.

3. NOTES TO PREPARING PREAMBLES

3.1 The Preambles should include only those items that constitute the cost of the works but would not be priced separately as they are expected to be included in the unit prices. Care should be taken to ensure that these items are not are petition of the conditions of contract. The Preambles should indicate the inclusiveness of the unit prices and should state the methods of measurement that have been adopted in the preparation of the Bill of Quantities, that are to be used for the measurement of any part of the Works. The units of measurement and abbreviations should be defined and any mandatory national units defined and described. The methods of and procedure for re- measurement should be described in the Preambles.

3.2 The rates and prices tender in the priced Bills of Quantities shall, except in so far as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

3.3 A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

3.4 The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bills of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.

3.5 General directions and descriptions of work and materials are not necessarily repeated

nor summarized in the Bills of Quantities. References to the relevant sections of the Contract documents shall be made before entering prices against each item in the priced Bills of Quantities.

3.6 Provisional Sums and contingency sums included and so designated in the Bills of Quantities shall be expended in whole or in part at the direction and discretion of the Architect in accordance with Sub-Clause13.5 and Clause 13.6 of the General Conditions of contract.

3.7 In preparing the Bills of Quantities, notes should be removed as they are intended to guide the person preparing the Tender Documents. The Contractor must allow in his rates for any costs associated with and complying with the requirements in the Preambles.

3.8 Should a tenderer/contractor not price any item in any section of the Bills of Quantities including Preliminary items, it will be assumed that he/she has spread its cost in other areas that he/she will have priced. Therefore, the item or items will be executed without any additional costs or without being treated like variations.

4. NOTES ON PREPARING BILLS OF QUANTITIES

4.1 The Preliminary Items should be limited to tangible items that should be priced by the tenderer, are identifiable and can be priced separately and included in the interim valuations

precisely. Such items may include such items as site office, notice boards, and other temporary works, otherwise items such as security for the Works which are primarily part of the Contractor's obligations should be included in the Contractor's rates.

4.2 The work items in the Bills of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. Such groups could be ground excavations, structures, external works, services, etc. General items common to all parts of the Works may be grouped as a separate section in the Bill of Quantities.

4.3 Quantities should be computed net from the Drawings, unless directed otherwise in the Contract, and no allowance should be made for bulking, shrinkage or waste. Quantities should be rounded up where appropriate.

4.4 Where the measured items a redeemed not to be exact because of the likelihood that the scope can change during the execution of the works, such items could be subject to re-measurement, the word **"provisional"** should be used to identify such cases. Where whole sections of the work items fall in this class, for example foundations, they should be labelled "Provisional Quantities" or "Provisional Items" so that the Tenderer/Contractor is advised up front that such items are subject to re-measurement to done before such work is cover-up.

4.5 All items that have not been measured and therefore not subject to tenders pricing should be listed in the Bills of Quantities as **Provisional Sums** for particular item or class of Work, which may be subject to a nominated subcontract or separate measurements at a later date during the execution of the works. For example, if it is deemed not possible to measure electrical works before going to tender because detail designs are not ready, a provisional sum can be allowed in the Bills of Quantities for "Installation of Electrical Works" to be executed later when actual design details are completed. To the extent not covered above, there should be in the Bills of Quantities a general provision for physical and financial contingencies made as a "Provisional Sum for Contingencies" and "Provisional Sum for Fluctuations".

PREAMBLES

1. The method of measurement of completed work for payment shall be in accordance with

The Standard Method of Measurements for Building Works and Associated Civil Works for Eastern Africa (2nd edition) of 2008 prepared by The Architectural Association of Kenya (Quantity Surveyors Chapter)

2. The Site is situated at **KEFRI-LONDIANI- KERICHO COUNTY.** The Contractor shall visit the site and acquaint themselves with its nature and position, the nature of the ground, substrata and other local conditions, positions of existing power, water and other services, access roads or any other limitations that might affect his cost or progress. No claim for extras shall be considered on account of lack of knowledge in this respect.

3. The Contractor shall obtain the Architect's approval on the siting of all temporary buildings, spoil heaps, temporary access path, and storage of materials. The Contractor shall also obtain the Architect approval and direction regarding the use of any materials found on the Site.

4. The drawings used in the preparation of these Bills of Quantities can be inspected at the offices of the Procuring Entity or Procuring Entity's Representative during normal working hours. Two sets of the Working Drawings shall be provided to the contractor but additional copies shall be provided at a cost to be determined by the Engineer.

5. The Contractor shall allow for the payment of all bank charges in connection with the procurement of Bank Guarantees and stamp charges in connection with this contract Agreement.

6. The Contractor shall carry out the various sections of the Works in such an order as the Architect May direct. The Procuring Entity reserves the right to occupy the Works by sections on completion provided that such occupation is considered to be both practical and reasonable and will not interfere with the Works. The Contractor shall allow any costs associated with such occupation.

7. The main Contractor will be fully responsible for paying his Sub-Contractor but the Procuring Entity reserves the right in very exceptional circumstances to make such payments direct in the interests of the project where the completion thereof might be jeopardized by any dispute or vicariousness between the Contractor and the Sub-Contractor involve.

8. The Contractor shall complete and deliver the Works in the period inserted in the Form of Tender as his time for completion of the Works from the date for Possession, to be agreed with the Engineer. The Contract Period is presumed to have been calculated making due allowance for seasonal inclement weather conditions. No claim for extension of time due to the normal inclement weather for this area shall be entertained.

9. The Contractor shall, upon receiving instructions to proceed with the Works, draw up a Programme and Progress Chart setting out the order in which the Works are to be carried out, with the appropriate dates thereof. This Chart shall be agreed with the Architect and

no deviation from the order set out in it will be permitted without the written consent of the Engineer. The Contractor will be responsible for arranging the above programme with all his sub-Contractors and Specialties. The Contractor shall allow in his rates for carrying out this exercise, and for updating it as required.

10. The Contractor shall submit to the Architect on the first day of each week or such longer period as the Architect from time to time direct, a Progress Report and any information for the proceeding period, showing the progress during the period and the up-to-date cumulative progress on all important items of each section or portion of the Works.

11. The Contractor shall arrange for photographs of the Site to be taken by a professional photographer approved by the Engineer. The Photographs shall provide a record of the Site and adjacent are as prior to the commencement of the Works and shall cover such portion of the works in progress and completion as the Architect shall direct. All prints shall be full plate size, unmounted, and marked on the reverse side with the date of exposure, identification reference and brief description. The copyright of all photographs shall be vested in the Procuring Entity. The negatives and four prints from each negative shall be delivered to the Architect within two weeks of exposure.

12. 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 comparable dimensions shown on the drawings. The Contractor shall be responsible for the accuracy of such dimensions

13. 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. Where appropriate the Contractor shall open up the ground in advance of the main work by hand digging, if necessary, to locate precisely the position and details of the services which are likely to affect his operations.

14. 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 route as are permitted by the Authorities.

15. The Contractor will be required to make good, at his own expense and damage he may cause to the present road surface and pavements within or beyond the boundary of the Site, during the period of the works. All existing paths, storm water channels, etc., that may be destroyed or damaged during the progress of the Works shall be reinstated by the Contractor to the satisfaction of the Engineer.

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

17. All water shall be fresh, clean and pure, free from earthly, vegetable or organic matter, acid or alkaline substance in solution. The Contractor shall provide at his own risk and cost all water for use in connection with the Works, (including works of sub–contractors). If need be, he shall make arrangements with the Local Water Authority for the installation of a separate meter for all water used by him throughout the Contract and pay all cost and fees in connection therewith. He shall also provide temporary storage tanks and tubing, etc., as may be necessary, and clear away at completion.

18. The Contractor shall provide all artificial lighting and power for his own use on the Works, (including Sub – Contractor's) including all temporary connections, wiring, fittings, etc., and clearing away on completion. The Contractor shall pay all fees and obtain all permits in connection there with.

19. 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. (Including works of sub – contractors). Such Agent or Representative shall receive on behalf of the Contractor directions and instruction from the Engineer, and such directions and instructions shall be deemed to be given to the contractor in accordance with the Conditions of Contract. The Agent shall not be replaced without the specific approval of the Engineer.

20. The Contractor shall ensure that the safety of his work people and all authorized visitors to the site are protected at all times. In particular, there shall be the proper provision of guard–rails to scaffolding, protection against falling materials, tools on site, dust, nail and other sharp objects. The site shall be kept tidy and clear of dangerous rubbish. The Architect shall be empowered to suspend work on site should it be considered this condition is not being observed and no claim arising from such suspension will be allowed.

21. They are as available to the Contractor for work yards, offices and other facilities shall be directed by the Architect and any existing features to remain shall be protected from damage throughout the Contract Period and handed back in good condition when they are vacated at the end of the Contract. If additional areas are required, the contractor shall source then own cost.

22. The Contractor shall give the Architect reasonable notice of the intention to set out or take levels for any part of the Works so that arrangements may be made for checking the work. The accuracy of setting out and leveling shall be within the tolerances specified in the Specifications or on the Drawings. The checking of setting out or leveling by the Architect shall not relieve the Contractor of his duties or responsibilities under the Contract.

23. The Contractor must take steps necessary to safe guard and shall beheld fully responsible for any damage caused to existing and adjacent property, including buildings that are not a subject of demolition. He shall make good at his own cost damage to persons and property caused there on, and he shall indemnify the Procuring Entity against any loss or claim that may arise.

24. The Contractor shall take such steps and exercise such care and diligence as to minimize nuisance arising from dust, noise or any other cause to the occupiers of the existing and adjacent property. He must provide such temporary and special screens and tarpaulins or gummy bags, hoarding, barriers, warning signs etc. as he considers necessary and sufficient for the protection of the existing and adjacent property and or prevention of nuisance etc. as directed by Engineer.

25. The Contractors attention is drawn to the standards levy order which was amended on 15thOctober 1998.Legal notice No.154 of 1998. The Contractor is required to pay a monthly level of 0.2% of his factory price of construction works with effect from January 1999. Tenderer shall allow for this in the build-up his rates.

26. The Contractor shall provide temporary sheds, offices mess rooms, sanitary, accommodation and other temporary buildings for the use of the contractor and sub-contractors, including lighting furniture equipment and attendance.

27. Contractor shall provide/build labor camp sat areas to be agreed with the Engineer. Labor camps shall be complete with sanitary accommodation and fencing gates.

28. The Contractor must provide the necessary toilet facilities to the requirement 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.

29. 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.

30. The Contractor shall provide all necessary hoists, tackle, plant, equipment, vehicles, tools and appliances of every description for the due and satisfactory completion of the Works and shall remove the same on completion. All such plant, tools and equipment shall comply with all regulations in force throughout the period of the Contract and shall be altered or adopted during the Contract period as may be necessary to comply with any amendments in or additions to such regulations.

31. Provide, erect and maintain all necessary scaffolding, sufficiently strong and efficient for the due performance of the works, including Sub-Contract Works, provide special scaffolding as required by Sub-Contractors, alter and adopt all scaffolding as and when required during the Works, and remove on completion. No scaffolding is measured here

in after and the Contractor must allow in his rates for this.

32. The Contractor shall take all necessary precautions such as temporary fencing, hoarding fans, planked footways, guard–rails gantries screen, etc., for the safe custody of the Works, materials and public protection and adjacent properties.

33. Cover up all 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.

34. The Contractor shall, after completion of the works, at his own expense, remove and clear away all surplus excavated demolition 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 Engineer, sheds, camps, etc. Particular care shall be taken to leave clean all floors and windows and tore move all paint and cement all rubbish and dirt as it accumulates. The Contractor is to find his own dump and shall pay all charges in connection there with.

35. Concrete test cubes shall be prepared in a set of three, as described including testing fees, labor and materials, making molds, transport, handling, etc. Allow in your rates for making at least four cubes on each occasion, from different batches; the concrete being taken from the point of deposit.

36. The Contractors shall furnish at the earliest possible opportunity before work commences, and at his own cost, any samples of materials and workmanship that may be called for by the Architect for the approval or rejection, and any further samples in the case of rejection, until such samples are approved by the Engineer. Such samples, when approved, shall be the minimum standard for the work to which they apply. The procedure for submitting samples of materials for testing or approval and the method of marking for identification shall be as laid down by the Engineer. The Contractor shall allow in his Tender for such samples and tests, including those in connection with his Sub-Contractors work.

37. The Contractors attention is drawn to the Finance Bill of the year 2000/2001 on withholding tax on contractual payment section 35(7)(i)(ii) which became effective on 1st July 2000. A 3% withholding tax will be applicable to all interim payments exceeding Kshs……..……. for work done in respect of building or civil works. The contractor shall allow for any costs arising resulting there from in the build-up of rates.

38. Blasting will only be allowed with the express permission of the Architect in writing. All blasting operations shall be carried out at the Contractor's sole risk and cost, in accordance with any Government regulations in force for the time being, and any special regulations laid down by the Architect governing the use and storage of explosives.

39. The National Construction Authority is a state corporation established under the national

construction authority Act No.14 of 2011. The broad Mandate of the Authority is to oversee the construction industry and coordinate its development. The National Construction Authority Regulations 2014 with an effective date of 6thJune 2014, regulation 25, - Allow 0.5% of the tender sum/contract sum for construction levy.

40. The Contractor attention is drawn to Finance Bill of 1993 where VAT was introduced in all contracts for construction services. The tenderer is also drawn to VAT Act Cap 476 clause 19(9). The tenderer must allow for VAT 1.19 as instructed elsewhere.

41. The contractor shall allow and pay for all insurance to cover risks and indemnities required Items 17 and 18 of the Conditions of contract and also specified in the Special Conditions of Contract.

BILLS OF QUANTITIES

The Bills of Quantities are divided generally into Two sections: -

A. Installation Items

The brief description of the items in these Bills of Quantities should in no way modify or supersede the detailed descriptions in the contract Drawings, conditions of contract and specifications.
The unit of measurements and observations are as per those described in clause 1.05 of the section C.

B. Summary

The summary contains tabulation of the separate parts of the Bills of Quantities carried forward with provisional sum, contingencies and any prime cost sums included. The sub-contract shall insert his totals and enter his grand total tender sum in the space provided below the summary. This grand total tender sum shall be entered in the Form of Tender provided elsewhere in this document

A. Installation Items

PROPOSED C O N S T R U C T I O N OF SEED CENTERS PHASE 2 -LONDIANI CENTRE					
MECHANICAL INSTALLATION WORKS					
MECH-Bill 1: SANITARY FITTINGS					
Item	**Descript**	**Unit**	**Qty**	**Rate Kshs**	**Cost Kshs**
	Supply, deliver and install the following equipment as described. Prices to be inclusive of all taxes. Equipment to be approved before installation. Supply, deliver, install, test and commission the following sanitary appliances complete with all the accessories including all connections to the services, waste, jointing to water supply overflows, supports and all plugging and screwing to walls and floors.				
	(i) All sanitary fittings shall be in approved color				
	(ii) The Model and Ref No. indicated is only a guide to the type and quality of fittings.				
	(iii) Equivalent and Approved models may be acceptable.				
	LADIES WASHROOMS				
A	**Water Closet Suite: Close Coupled** Close Coupled Water Closet Suite. The W. C. should come complete with white ceramic wc pan, white seat and seat cover with stainless steel hinges. The suite to have dual flushing system (full and half) operated from the top of the cistern. Preferred WC dimensions to be 370mm x 650mm to be as "**Duravit - D-Code**" or approved equivalent.	**No.**	**3**		
B	**Toilet Roll Holder** U-shaped chrome plated wall mounted toilet roll holder as "**Duravit**" or approved equivalent.	**No.**	**3**		
C	**Soap Dispenser** Wall mounted push-button stainless-steel satin finish liquid soap dispenser. Dispenser to be as "**Mediclinics**" or approved equivalent.	**No.**	**1**		
D	**Polished Mirror** 6mm thick full Length polished dressing mirror with beveled edges. Size: 450mmx600mm mounted on the wall. Mirror to be mounted on an appropriate impact absorption material of approved specifications. Mirror to be as "**Impala**" or approved equivalent	**No.**	**3**		
E	**Tissue Dispensing Unit** Stainless steel flat sheets tissue dispensing unit to hold 250 sheets.	**No.**	**1**		
F	**Bathroom Waste Paper Bin** 10 Liter stainless steel waste paper bin.	**No.**	**1**		
G	**Countertop Wash Hand Basin (Public)** White countertop ceramic wash hand basin with single taphole. Preferred dimension: 600 x 460mm x 150mm.Basin to be as "**Duravit**", "**D-Code**" or approved equivalent. Other accessories to include; chrome plated waste pop-up, bottle trap and drainage fitments.	**No.**	**3**		
H	**Basin Faucet - Press down delay** Press down delay chrome plated basin faucet to be as "**Vado**" or approved equivalent.	**No.**	**3**		
I	**Arabian Shower** Chrome plated wall mounted Arabian shower with the following features,Heavy duty chrome plated flexible hose,Spray rose with press lever operation Chrome plated mounting bracket for the spray rose above	**No.**	**0**		
	Total C/F to Next Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Total brought down from previous page				
	GENTS WASHROOMS				
A	**Water Closet Suite: Close Coupled** Close Coupled Water Closet Suite. The W. C. should come complete with white ceramic WC pan, white seat and seat cover with stainless steel hinges. The suite to have dual flushing system (full and half) operated from the top of the cistern. Preferred WC dimensions to be 370mm x 650mm to be as "**Duravit - D-Code**" or approved equivalent.	**No.**	**2**		
B	**Toilet Roll Holder** U-shaped chrome plated wall mounted toilet roll holder as "**Duravit**" or approved equivalent.	**No.**	**2**		
C	**Soap Dispenser** Wall mounted push-button stainless-steel satin finish liquid soap dispenser. Dispenser to be as "**Mediclinics**" or approved equivalent.	**No.**	**1**		
D	**Polished Mirror** 6mm thick full Length polished dressing mirror with beveled edges. Size: 1500mmx600mm mounted on the wall. Mirror to be mounted on an appropriate impact absorption material of approved specifications. Mirror to be as "**Impala**" or approved equivalent.	**No.**	**1**		
E	**Tissue Dispensing Unit** Stainless steel flat sheets tissue dispensing unit to hold 250 sheets.	**No.**	**1**		
F	**Bathroom Waste Paper Bin** 10 Liter stainless steel waste paper bin.	**No.**	**1**		
G	**Countertop Wash Hand Basin (Public)** White countertop ceramic wash hand basin with single taphole. Preferred dimension: 600 x 460mm x 150mm.Basin to be as "**Duravit**", "**D-Code**" or approved equivalent. Other accessories to include; chrome plated waste pop-up, bottle trap and drainage fitments.	**No.**	**2**		
	Total C/F to Next Page				

item	description	unit	qty	rate	Amount
	Total brought down from previous page				
H	**Basin Faucet - Press down delay** Press down delay chrome plated basin faucet to be as "**Vado**" or approved equivalent.	**No.**	**2**		
I	**URINALS** Comprising of two Urinal bowls in white vitreous China complete with 7.5litres automatic ceramic cistern ref CX 8611 WH, and fittings including siphon ball valves, cistern supports and drip tap in brass, chrome plated bottle traps, chrome plated flush pipes and spreaders ref SS 6071SS with all connections, wall hangers/supports and divisions. To be as Twyfords Camden' or approved equivalent.	**item**	**1**		
	Urinal Bowls	**No.**	**0**		
J	Ceramic urinal bowl complete with 40mm heavy duty plastic bottle trap and 40mm diameter chrome plated outlet with grating firmly fixed on the wall with chrome plated screws. The fittings shall be as Roca or equal and approved.	**No.**	**1**		
K	**Urinal Bowl Divisions** Ceramic urinal bowl divisions separating the above-described urinal bowls fixed firmly on the wall. The fittings shall be as Roca or equal and approved.				
L	**Urinal Bowl flash valves** 32mm urinal bowl flush valve for the above urinal bowls completes with, back entry with integral vacuum breaker, non-hold-open features and non-return valve, inlet control stops and wall plate comprising flush valve, bent chrome plated flush pipe and rubber pipe connector. The flush valve to be push button type. The fittings shall be as 'Docol' or equal	**No.**	**2**		
M	**Urinal Bowl Range (Hands free automatic flush)** Urinal range consisting of 2 Urinal bowls, infra-red(electronic) automatic flushing system, stainless steel spreader pipes and spreader nozzles. The bowls to be made of vitreous China white in color. Urinal range to be as **"Duravit", "D-Code"** or approved equivalent. Infra-red flushing system, with electronic flush actuation mains operated, to be as "**Geberit**" or approved equivalent with satin finish face plate.	**ITEM**	**0**		
N	**Cleaners Sink** Heavy duty sink size 465 x 410 x 285mm deep in enameled fireclay complete with hardwood pad on the front edge and fitted bucket stainless steel grating and 20mm chrome plated wall mounted inclined **Bricon tap**, chrome plate chain and rubber stopper and heavy gauge 40mmn chrome plated bottle trap, stainless steel legs and bearers and 32mm grid waste fitting. All as **Duravit "cleaners sink"** or approved equivalent.	**No.**	**1**		
O	**Cleaners Tap** Supply and install 20mm dia off the wall tap with wall flange for splash area. Tap to be as VADO or equal and approved.	**No.**	**1**		
P	**Ambulant Disabled Water Closet** Low level wash down water closet suite for the elderly and disabled in white complete with horizontal outlet AND BOTTOM SUPPLY AND OVERFLOW WITH CLOSE COUPLING SIDE LEVER TREATMENT, 7.5-liter cistern, raised heavy duty toilet seat and cover and S-trap outlet and 600 x 35mm stainless steel grab rails (3No.) in stainless steel, 450 *600mm mirror, 550 *440 mm wash hand basin complete with all waste connections and tap in. All to be as "Twyfords Avalon BTW" or approved equivalent	**No**	**1**		
SUB-TOTAL FOR SANITARY FITTINGS TO SUMMARY PAGE					

MECH-Bill 2: Plumbing and Drainage

Item	Description	Unit	Qty	Rate	Amount
	INTERNAL WATER				
	SUPPLY PPR Pipes				
	Supply, deliver and install Polypropylene Random (PP-R) 20 pipework to DIN 8077 with joints, couplings, reducers, tees, adaptors, pipe fixing clips etc all to DIN 16962 and DIN 16928. Pipe jointing shall be by profusion or use of electric coupling. Where pipework is not chased proper anchoring using approved fixtures shall be done. No pipework shall be left exposed to the sun. Rates must allow for all Metal/plastic threaded adaptors where required for the connection of sanitary fixtures, valves, sockets, sliding and fixed joints,support raceways, isolating sheaths, elastic materials, expansion arms and bends, crossovers, couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system.				
	Pipe work-PPR PIPES	**LM**			
A	20mm diameter pipework	**LM**	**20**		
B	25mm diameter pipework	**LM**	**50**		
C	32mm diameter pipework	**LM**	**50**		
D	40mmmm diameter pipework	**LM**	**20**		
E	50mm diameter pipework		**20**		
	Bends	**No**			
A	20mm diameter bend	**No**	**7**		
B	25mm diameter bend	**No**	**5**		
C	32mm diameter bend	**No**	**5**		
D	40mm diameter bend	**No**	**5**		
E	50mm diameter bend		**3**		
	Tees	**No**			
A	20mm equal tee	**No**	**5**		
B	25mm equal tee	**No**	**2**		
C	32mm equal tee	**No**	**5**		
D	40mm equal tee	**No**	**2**		
E	50mm equal tee		**2**		
	Reducers	**No**			
A	25 x 20mm diameter reducer	**No**	**5**		
B	32 x 25mm diameter reducer		**5**		
	Male/Female Adapters (Brass threaded)				
A	20mm brass threaded adapter	**No**	**5**		
B	25mm brass threaded adapter	**No**	**7**		
C	32mm brass threaded adapter	**No**	**8**		
	Male/Female Bend (Brass threaded)				
A	25mm brass threaded bend	**No**	**10**		
B	32mm brass threaded bend	**No**	**10**		
	Flexible Tubing				
A	15mm diameter x 300mm long flexible connectors complete with integral chrome plated angle valve as Cobra or equal and approved.	**No**	**10**		
	Threaded Brass Coupling	**No**	**1**		
A	25mm threaded brass coupling	**No**	**1**		
B	32mm threaded brass coupling				
	Valves				
A	25mm gate valve	**No**	**2**		
B	32mm gate valve	**No**	**2**		
C	40mm gate valve	**No**	**0**		
D	50mm gate valve	**No**	**2**		
	Total C/F to Next Page				

Item	Description	Unit	Qty	Rate	Amount
	Total brought down from previous page				
	Unions				
A	25mm diameter pipe union	**No**	**5**		
B	32mm diameter pipe union	**No**	**3**		
C	40mm diameter pipe union	**No**	**2**		
D	50mm diameter pipe union	**No**	**2**		
	Pipe Sleeves				
A	100mm diameter heavy duty PVC pipe sleeves for crossing over columns and beams.	**LM**	**20**		
	FOUL WATER INTERNAL DRAINAGE ***Supply ,deliver and install the following UPVC, MUPVC, soil and waste systems respectively to B.S 5255 with fittings fixed to Manufactures Printed instructions and manufactured by reputable manufacturers. Tenderers must allow in their pipework prices for all the couplings, clippings, connectors, joints etc. as required in the running lengths of pipework and also where necessary, for pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system.***				
	MuPVC and uPVC Waste and Soil pipework				
A	100mm diameter heavy gauge golden brown UPVC pipe	**LM**	**50**		
B	100mm diameter heavy gauge grey UPVC pipe	**LM**	**30**		
C	50mm diameter waste pipe	**LM**	**30**		
D	40mm diameter waste pipe	**LM**	**20**		
E	32mm diameter waste pipe	**LM**	**20**		
	Bends				
A	100mm diameter long radius bend	**No**	**10**		
B	100mm diameter short radius bend	**No**	**3**		
C	100mm diameter bend with access	**No**	**6**		
D	100mm diameter sweep bend	**No**	**3**		
E	50mm diameter sweep bend	**No**	**3**		
F	40mm diameter sweep bend	**No**	**3**		
G	32mm diameter sweep bend	**No**	**5**		
	Tees				
A	100mm diameter sweep tee	**No**	**3**		
B	50mm diameter sweep tee	**No**	**2**		
C	40mm diameter sweep tee	**No**	**3**		
D	32mm diameter sweep tee	**No**	**5**		
	Access Caps				
A	100mm diameter access cap	**No.**	**5**		
B	50mm diameter access cap	**No.**	**5**		
C	40mm diameter access cap	**No.**	**3**		
D	32mm diameter access cap	**No.**	**6**		
	Boss Connectors				
A	100 x 50mm diameter boss connector	**No.**	**5**		
B	100 x 40mm diameter boss connector	**No.**	**5**		
	Total C/F to Next Page				

Item	Description	Unit	Qty	Rate	Amount
	Total brought down from previous page				
A	**Single Branches** 100mm diameter single branch	**No.**	**5**		
B	**Weathering Slates and Vent Cowl** 100mm diameter weathering slate and apron.100mm diameter vent cowl	**No.**	**2**		
C	**WC Connectors** 100mm diameter WC connector	**No.**	**2**		
D	**Traps** 100 x 50mm diameter floor trap and grating	**No.**	**6**		
E	Standard 300 x 300 x 450mm masonry gully trap complete with approved flanged iron cover.	**No.**	**5**		
F	**Inspection chambers** 600x450mm standard inspection chamber with heavy-duty cast-iron covers	**No.**	**5**		
G	**Testing and commissioning** Allow for hydrostatic pressure testing of all the pipework before covering, to the approval of the mechanical engineer. This shall include initial filling the supplied water tank with water to capacity	**Item**	**1**		
H	Allow for testing and commissioning of all the sanitary fittings to the approval of the mechanical engineer	**Item**	**1**		
SUB-TOTAL FOR PLUMBING AND DRAINAGE TO SUMMARY PAGE					

MECH-Bill 3: External water reticulation and storage

Item	Descriptio	Unit	Qty	Rate	Amount
	Water Storage Tank				
A	Supply, deliver and install a vertical close end plastic molded tank of capacity 5,000litres and diameter 1,930 x 1,960mm high. The tank to be made from LDPE/HDPE approved food grade polyethylene material. Should be non-toxic and non-absorbent and should not impart any taste or odour. The tank to be non-corrosive, molded in a single piece without seams, joints or welds, completely leak proof, hence minimizing losses due to shut down; tough and durable outer walls, which are resistant to moisture, chemicals, sunrays, and electric current.The tank to be assembled complete with cover and having screwed GI connections for inlet, outlet interconnection, overflow, 32mm high pressure ball valve, drain pipes and any other necessary item for its proper functioning. The tank shall be as Roto Model or approved equivalent.	**item**	**1**		
B	Ditto for 10,000ltrs, 2190 *2920mm high	**Item**	**0**		
	External water reticulation				
	Valves				
C	Supply and install 50mm diameter single orifice air valve, complete with pipe mounting accessories as '**Glenfield**'.	**No**	**1**		
D	50mm diameter gate valve as '**Pegler**' or approved equivalent	**No**	**1**		
E	32mm diameter gate valve as '**Pegler**' or approved equivalent	**No**	**1**		
F	Ditto for 25mm	**No**	**1**		
G	**Valve Chamber** Standard precast concrete valve chamber of size 450 x 450 x 450mm deep made of concrete (1:3:6) base, including formwork, excavations backfilling and disposal.	**No**	**3**		
	Pipework Supply, deliver and install galvanized mild steel pipes to BS 1387 class 'B' with screwed and socketed joints to BS 134 and 1256 and of approved manufacturer with galvanizing to BS 729. Contractors must allow in their pipe work prices for all the couplings, unions, connectors joints, holder bats, reducers etc. as required in the running length of the pipework and also where necessary for pipe fixing clips, plugged and screwed.				
H		**No**	**20**		
I	**65mm dia. gms pipe**	**No**	**30**		
J	**50mm dia. – Ditto -**				
	Excavation				
K	Excavate trench 300mm wide and 500mm deep to lay plumbing pipes. The laid pipes to be covered with 50mm thick layers of fine soil, back filled, rammed and excess soil carted away.	**LM**	**50**		
L	**STERILIZATION** Allow for sterilization including flushing out water and chlorinating to the approval of the Engineer.	**item**	**1**		
	Washing Stand Pipe				
	15mm diameter chrome plated bib taps as '**Cobra**' suitable for hose pipe connection complete with threaded adaptors connected to a wall mounted 15mm diameter firmly anchored ppr pipe with associated fittings	**No**	**1**		
F	**WATER METER** **50mm water meter**	**Item**	**1**		
SUB-TOTAL FOR EXTERNAL WATER RETICULATION TO SUMMARY PAGE					

MECH-Bill 4: Laboratory Fittings, Plumbing and Drainage

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	LABORATORY FITTINGS				
	Supply, deliver and install the following vulcathene laboratory system including waste outlets, sinks, drip cups, anti-siphon traps, dilution recovery traps and associated comprehensive range of pipe and fittings for the given sizes all as vulcathene or approved equivalent				
	Laboratory sink				
A	A sink of preferred dimensions 552mm x 400mm with a depth of 235 mm having a drain of 74mm, that is extremely robust and molded from polypropylene co-polymer resin with a self-draining base with its recessed outlet to accept the flange of 1 1/2" (40mm) non overflow threaded outlet but if required, an overflow assembly can be fitted. The sink to be complete with anti-siphon traps that can stop the backflow of potentially hazardous fumes. to be as method **MS 500 LAB SINK** or approved equivalent.	**No**	**4**		
B	**Flexible connector**				
	Stainless steel braided hose for incoming water connection with a superior stainless-steel finish and incorporated high quality **EDPM**, with a 10bar working pressure, **600**mm long to be complete with angle valves. To be as method **S900/S950** or approved equivalent	**No**	**4**		
C	**Three-way Assay Lab Faucet** in solid brass High gloss epoxy powder, resistant to most chemicals, UV fading and heat. Ceramic headwork;90 deg turn, water static pressure max 10bar. To be complete with detachable brass serrated nozzle, splash controlled water filter attachable, ergonomic high grade PP knob and 360 deg swing gooseneck spout.	**No**	**4**		
D	**Emergency Drencher Shower and Eye Fountain**				
	Body shower with eye/face shower and bowl modular in brass and stainless steel with chemical resistant red **BROEN-LAB** polycot with self-draining shower head. The shower head with a pull to open mechanism and eye wash with a foot pedal opening mechanism. Eye wash with built-in **FLOWFIX** for regulation of water flow at14l/min. Bowl in stainless steel with integrated out with a min working pressure of 1.5bar. all as **BROEN-LAB** or equal and approved	**No**	**1**		
E	**Emergency shower instructions** Wall mounted sign and instruction card for Body and Eye Shower above	**No**	**1**		
F	**Builders works** for the shower above including a wall not more than 300mm high, enclosing the emergency shower area of approximate dimensions of 1m x 1.5m, with a suitable slope towards the floor trap As directed by the engineer	**Lot**	**1**		
G	**Dilution traps**				
	Dilution Recovery Traps with a capacity of 4.5 liters with a trap seal of 76mm and three top inlet connections. To be made of heat resistant borosilicate glass base and supplied complete with horizontal inlet adapter, vertical inlet, glass dip tube and blanking off plug together with suitabler support and nut couplings for screwing to waste inlets and outlets as **Method V915P/V910P or equal and approved.**	**No**	**2**		
H	**Gully traps**				
	430mm * 330mm * 340mm (L *W *H) gully trap made from heavy gauge **polypropylene co-polymer resin** as Method PP060 or approved equivalent. The gully trap to be complete with heavy gauge cover	**No**	**2**		
I	**LABORATORY PIPEWORK-FOUL WATER INTERNAL DRAINAGE**				
	Supply, deliver and fix the following in UPVC soil and waste systems to BS 4514 and 5225 with fittings fixed in accordance to the manufacturer's printed instructions and BS 5572 and manufactured by "KEY TERRAIN" for UPVC and vulcathene pipes by "VULCATHENE-DURAPIPE-S&LP" as described. All UPVC and vulcathene branches, Tees, reducing Tees, reducers etc. are to be formed in accordance to the manufacturer's printed instruction. The installations to have the various sizes of connectors, adaptors, sockets, reducers hold bats, clips etc. as required for satisfactory functions.				
	Vulcathene Pipes				
A	38mm diameter vulcathene pipe	**Lm**	**20**		
B	51mm diameter vulcathene pipe	**Lm**	**10**		
C	102mm diameter vulcathene pipe	**Lm**	**0**		
	Total C/F to Next Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Total brought down from previous page				
	Vulcathene Floor Traps				
E	100x50mm diameter acid resistant floor trap	**Lm**	**4**		
	Bends				
F	38mm diameter vulcathene sweep bend	**Lm**	**5**		
G	51mm diameter vulcathene sweep bend	**Lm**	**1**		
H	102mm diameter vulcathene sweep bend	**Lm**	**1**		
	Pipe Sleeves				
I	63mm diameter heavy duty PVC pipe sleeves	**Lm**	**5**		
	Access Caps				
K	32mm diameter access cap	**No**	**3**		
L	50 mm diameter heavy duty PVC pipe sleeves	**Lm**	**5**		
	INTERNAL PLUMBING				
	All provisional Supply, deliver and install tubing and fittings and described and shown on the drawings. Bidders must allow for jointing, clipping, coupling etc necessary for the proper and satisfactory functioning of the system when pricing. The following in PN 20 PPRC conforming to the current European standards for PPR installation and to the Engineers approval, pipe jointing shall be by profusion or use of electric coupling Rates must allow for all metal/plastic threaded adopters where required for the connection of sanitary fixtures joints support raceways, isolating, sheaths, elastic materials, expansion arms and bends, crossovers etc				
	Pipe work-PPR PIPES				
A	40mm diameter pipework				
B	32mm diameter pipework				
C	25mm diameter pipework	**Lm**	**0**		
D	20mm diameter pipework	**Lm**	**25**		
	Bends	**Lm**	**10**		
E	20mm diameter bend	**Lm**	**5**		
F	25mm diameter bend				
G	32mm diameter bend	**No**	**5**		
H	40mm diameter bend	**No**	**5**		
	Tees	**No**	**6**		
I	20mm equal tee	**No**	**0**		
J	25mm equal tee				
K	32mm equal tee	**No**	**3**		
L	40mm equal tee	**No**	**3**		
	Un equal Tees	**No**	**3**		
M	32 x 25 x 25 mm diameter reducer	**No**	**0**		
	25 x 25 x 20 mm diameter reducer				
	Male/Female Adapters (Brass threaded)	**No**	**3**		
N	20mm brass threaded adapter				
O	25mm brass threaded adapter	**No**	**5**		
	Valves	**No**	**5**		
P	40mm gate valve				
Q	32mm gate valve	**No**	**0**		
R	25mm gate valve	**No**	**2**		
	Reducers	**No**	**2**		
S	40mm x 32mm				
T	32mm x 25mm	**No**	**0**		
U	25mm x 20mm	**No**	**5**		
	Unions	**No**	**3**		
V	40mm diameter pipe union				
W	32mm diameter pipe union	**No**	**0**		
		No	**5**		
	Testing and Commissioning				
X	Allow for testing and commissioning of the plumbing and drainage installations and sterilization works to the approval of the project manager to the satisfaction of the Engineer.	**Item**	**1**		
SUB-TOTAL FOR LABORATORY WORKS TO SUMMARY PAGE					

MECH-Bill 5: Cold Room

item	Description	Unit	Qty	Rate (Ksh)	Amount (Ksh)
	Cold-room Installation				
	Evaporator Unit				
A	The evaporator unit with a cooling load to match a condensing unit of 3.0 kW complete with cooling coil, defrost heater, expansion valve, air circulating fans, guards, drip tray, drainage pipework outlet, supports etc. The unit to be complete with a power supply and to be as Thermoway Turkey Manufactured Model or equal.	**No**	**1**		
B	**Evaporator Unit Support** Allow for a suitable wall mounting support for the above that can match the panel used for constructing the cold room	**No**	**1**		
C	**Condensing Unit** An air-cooled condensing unit with semi-hermetic reciprocating compressor capable of a cooling load of 3.0kw to match the evaporator unit and to be complete with fan, compressor, condenser, liquid receiver, controls, anti-vibration mountings etc. Unit to use a refrigerant that complies with the Montreal Protocol and NEMA, have a power supply and to be as Bitzer Germany Manufactured or equal.	**No**	**1**		
D	**Control Panel** The panel shall be complete with contactors, timers and all other accessories necessary for the automatic operation of the cold store.	**No**	**1**		
	Controls				
A	Thermostatic expansion valve				
B	Filter drier to match refrigerant capacity that can carry the above cooling load of 3 kW to be as Danfoss or equal.	**No**	**1**		
C	Sight glass with color coding	**No**	**1**		
D	Low pressure gauge	**No**	**1**		
E	High pressure gauge	**No**	**1**		
F	Room thermostat to cut compressor in and out, depending on the room temperature.	**No**	**1**		
G	Dial thermometer	**No**	**1**		
H	Solenoid valve	**No**	**1**		
I	Low and high cut-out switch	**No**	**1**		
J	**Light Fitting** 65 watts vapor proof light fitting		**1**		
K	**Refrigerant Pipework** Refrigeration pipework complete with armflex Insulation for both the **liquid line** and the **suction line** to match the evaporator unit and condensing unit. The pipework to be complete with all the necessary bends, reducers, Y's, joints, distributors, support brackets etc. a distance of **10m** between the two units	**No** **Item**	**4** **1**		
	Total C/F to Next Page				

Item	Description	Unit	Qty	Rate (Kshs)	Amount (Kshs)
	Total brought down from previous page				
	Refrigerant				
L	Allow for the charging of the refrigeration system with necessary amount of refrigerant for initial testing and eventual operation of the cold store.	**Item**	**1**		
M	**Anti-Vibration Mountings**				
	Anti-Vibration Mountings for the condensing unit as WOODS P.N.50417 or equal.	**Item**	**1**		
N	40mm diameter class 41 uPVC condensate pipe complete with bends, tees, and access caps	**Lm**	**10**		
	Room Insulation				
O	100mm thick prefabricated TSSC sandwich panels with pressure injected polyurethane foam insulation of density 42 kg/cu. M and cladded with 0.5mm thick white Lacquered galvanized steel sheet panels as room insulation complete with aluminum supports. The panels should be supplied with all accessories to support all the four walls and roof in an open space	**SM**	**100**		
	Associated Electrical Works				
P	Allow for electrical works including but not limited to wiring and conduits from the local isolator provided by others within 10 meters in the machine room to the control panel, condenser and evaporator. It shall include a push and turn safety switch near the machines in the machine room for isolation during servicing and maintenance.	**Item**	**1**		
Q	Allow for as-built drawing, maintenance and operation manuals in both soft and hard copies. Three copies of the as-built drawing shall be submitted in A1 paper in a scale of 1:50	**Item**	**1**		
R	**Cold Room Door** Cold room doors whose overall size is 2500mm high by 1000 mm wide complete with opening handles and made of 100mm TSSC sandwich panels and cladded micron plastisol coated G.I sheet with fittings and gasket TPE rubber, slab gaskets even internally. The cold-room door to have hinges that raise the door body as it opens and fall as it closes. The door handles to be able to illuminate from inside.	**Set**	**1**		
	Storage racks.				
S	Stainless grade 316 steel 4 tier storage racks of size 1000 X 600 X 1800 MM on square tube stands with gromet fittings, anti-buckling reinforcement.	**No**	**4**		
T	**ditto for 3 tier rack**	**No**	**4**		
U	**Cold-room door air curtain** Single phase each with an air stream of width 1 m, air throw of 3m air volume of 1000m3 and air velocity of 7m/s.	**No**	**1**		
V	Allow for setting to work, testing and commissioning of the cold-room installation to the **APPROVAL** of the Project Engineer	**Item**	**1**		
SUB-TOTAL FOR COLD ROOM WORKS TO SUMMARY PAGE					

SUMMARY PAGE FOR MECHANICAL INSTALLATION WORKS			
ITEM	**DESCRIPTION**		**AMOUNT (Kshs)**
1	Total for Sanitary Fittings …... Bill-1		
2	Total for Plumbing and Drainage- Bill 2		
3	Total for External water Reticulation …. Bill 3		
4	Total for Laboratory works … Bill 4		
5	Total for Cold storage and associated works … Bill 5		
	TOTAL AMOUNT CARRIED TO MAIN COLLECTION PAGE		

Amount in words

……
……
……

Tender's Name and
Stamp……
……

Sub-Contract period……
weeks……

Signature……Date……
……

PIN.No……VAT CERTIFICATE NO:……

Witness……
Address:……
…..

Signature……Date……
……

SCHEDULE OF UNIT RATES

ITEM	DESCRIPTION	UNIT	RATE (KSh.)
1.	**PORTABLE EXTINGUISHERS**		
	i. 9 liters water/carbon dioxide gas portable fire extinguisher	NO	
	ii. 5kg carbon dioxide gas portable fire extinguisher		
	iii. 9kg dry chemical powder portable fire extinguisher		
	iv. AFO Fire Extinguishing Ball		
	v. Fire instruction notice		
	vi. Red fire alarm bell		
	(**Provide a rate for each**)		
2.	**AIR CONDITIONING**		
	i. A wall mounted inverter type AC- Cooling capacity 5.6kw (19,200 Btu/h) complete with a matching outdoor unit	NO	
	ii. A ceiling cassette inverter type AC- Cooling capacity 6.5kw (22,000 Btu/h) complete with a matching outdoor unit	NO	
3.	**SANITARY FITTINGS**		
	i. Hand drier with a heating capacity of 2.1kW	NO	
	ii. 6mm thick polished plate glass silver backed mirror with bevelled edges, size 800 x 650mm	NO	
	iii. window mounted 324mm hole diameter GX12 EC3 extractor fan complete with its mounting units, all as Xpelair GX12 EC3 or approved equavalent.	NO	
	iv. Close coupled wash down water closet in approved colour complete with horizontal outlet to BS 3402 with valveless cistern fittings including syphon, 15mm bottom inlet valve, 20mm bottom overflow, bolts and connecting fitments from cistern bowl, chrome-plated lever, heavy duty seat and cover and p-trap outlet connector all as Twyfords Galerie ref. No.GR1148 CH or approved equivalent	NO	
4.	**COLDROOM**		
	i. 150mm Polyurathene insulating panels	SM	
	ii. 100mm Polystyrene insulating panels	SM	
	iii. 150mm Polystyrene insulating panels	SM	
5	**ANY OTHER ITEM NECESSARY TO COMPLETE THE WORKS. (SPECIFY)**		

SECTION F:

TECHNICAL SCHEDULE OF ITEMS TO BE SUPPLIED.

TECHNICAL SCHEDULE

1. General Notes to the Tenderer

1.1 The tenderer shall submit technical schedules for all materials and equipment upon which he has based his tender sum.

1.2 The tenderer shall also submit separate comprehensive descriptive and performance details for all plant apparatus and fittings described in the technical schedules. Manufacturer's literature shall be accepted. Failure to comply with this may have his tender disqualified.

1.3 Completion of the technical schedule shall not relieve the Contractor from complying with the requirements of the specifications except as may be approved by the Engineer.

2. Technical Schedule

The tenderer must complete in full the technical schedule. Apart from the information required in the technical schedule, the tenderer **MUST SUBMIT** comprehensive manufacturer's technical brochures and performance details for all items listed in this schedule (fill forms attached).

ITEM	DESCRIPTION	MANUFACTURER	COUNTRY OF ORIGIN	REMARKS (Catalogue No. etc.)
1.	**LABORATORY FITTINGS** i. Emergency shower ii. Laboratory sink-acid resistant iii. Laboratory taps iv. Dilution traps v. Anti-siphonic bottle traps			
2.	**SANITARY FITTINGS** i) Close coupled toilet ii) Wash hand basin iii) PWD toilet set			
3.	**PIPEWORK** i) PPR pipe ii) UPVC pipe iii) Laboratory pipe			
4.	**WATER TANK**			
5.	**COLDROOM INSULATING PANNELS**			
6.	**COLDROOM EVAPORATOR UNIT**			
7.	**COLDROOM CONDENSING UNIT**			

The tenderer shall also submit separate comprehensive descriptive and performance details for all plant apparatus and fittings, as described in the technical schedule.

3. Statement of Compliance

I. I confirm compliance of all clauses of the General Conditions, General Specifications and Particular Specifications in this tender.

II. I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed: …….*for and on behalf of the Tenderer*

Date: ……..

Official Rubber Stamp: ……

SECTION G:

DRAWING SCHEDULE

CONTENTS

DRAWING SCHEDULE:

As shall be provided during project implementation.

EXTERNAL WORKS

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	EXTERNAL WORKS				
	RAISED CONCRETE WATER TANK STAND (6000mm high from ground level)				
	ELEMENT NO. 1				
	Substructure (all provisional)				
A	Clear area of new construction of all undergrowth, small bushes, grab up all trees and remove any existing structures and obstructions as directed.	16	Sm		
B	Excavate for column bases commencing from ground level level: not exceeding 1.5 m deep	24	Cm		
C	Return, fill and ram selected soil in foundations	15	Cm		
D	Remove surplus soil and debris from site to a place approved by local authority	9	Cm		
	Mass concrete mix (1:3:6):in				
E	Column bases	16	Sm		
	Vibrated reinforced insitu concrete class 20/20; with minimum cube crushing strength of 20N/mm² at 28 days; in				
F	Column bases	6	Cm		
G	Substructure Columns	1	Cm		
H	Ground Beams	2	Cm		
	Supply and fix mild steel bar in structural concrete work including cutting, bending, hoisting, tying wire, spacing blocks and supporting all in position				
I	Assorted Bars for substructure concrete	1350	Kgs		
	Carried to Collection				

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
	EXTERNAL WORKS CONTINUED				
	Sawn formwork: to				
A	Vertical sides of column bases	12	Sm		
B	Sides of columns	7	Sm		
C	Sides of ground beams	23	Sm		
	Superstructure works				
	Sawn formwork: to				
D	Sides and soffits: beams	69	Sm		
E	Sides of columns	43	Sm		
F	Soffits and sides of suspended slab	25	Sm		
	Vibrated reinforced insitu concrete class 20/20; with minimum cube crushing strength of 20N/mm² at 28 days; in				
G	Slab 150 mm thick	25	Sm		
H	Beams	5	Cm		
I	Superstructure Columns	3	Cm		
	Supply and fix mild steel bar in structural concrete work including cutting, bending, hoisting, tying wire, spacing blocks and supporting all in position				
J	Assorted Bars for superstructure concrete	1763	Kgs		
	Plaster: 15 mm cement/lime putty/sand: steel trowelled: on masonry or concrete: to				
K	Concrete surfaces	137	Sm		
L	Screed to the top of suspended slab	25	Sm		
	METAL WORK				
	Cat Ladder				
M	Caged steel ladder fabricated from 75 x 6 mm flat for cage and 25 x 25 x 3 mm thick tubes at 300 mm intervals including paintwork	3	Lm		
	Carried to Collection				
	COLLECTION				
	From page EW/1				
	From page Above				
	TOTAL FOR EXTERNAL WORKS CARRIED TO GRAND SUMMARY.				

CIVIL WORKS

PROPOSED CIVIL WORKS FOR LONDIANI SEED CENTRE.-KEFRI.

BILL NO 2:FOUL DRAINAGE

Item	Description	Unit	Qty	Rate	Amount	
						CTS
	15,000 LITRES SEPTIC TANK (50 PERSONS)					
A	Excavation pit for septic tank n.e. 1.5m deep)	CM	66			
B	Ditto between 1.5m and 3.0m deep)	CM	57			
C	Return fill and rum	CM	84			
D	Cart away surplus material	CM	39			
E	Provide lay & vibrated conc. 1:2:4 to base	CM	3			
F	Provide lay & vibrate conc. 1:2:4 to cover slab, buffer & dividing walls	CM	3			
G	Provide materials & erect 200mm thick masonary wall in cement motar 1:4	SM	51			
H	Provide formwork to soffit of suspended slab exceeding 1.5 m high	SM	13			
J	Ditto to edge of slab between 75 & 150mm high	LM	5			
K	Ditto to sides of walls	SM	8			
L	Make or leave dia. 100mm hole & build in dia 100mm pipe	NO	2			
M	Make or leave dia. 160mm hole & build in dia 160mm pipe	NO	2			
N	Make or leave rebated opening 600x450mm	No	4			
P	Build in dia. 100mm UPVC class 41 'Tee'	No	2			
Q	Provide & apply 12mm thick water proof plaster	SM	102			
R	Provide apply 25mm thick screed to floor slab	SM	12			
S	Provide cut bend & fix in wall BRC mesh type A142	SM	7			
T	Ditto dia. 10mm HT bars in slab	KG	162			
U	Planking & strutting to sides of excavations		ITEM			
V	Keep excavations free from general waters		ITEM			
W	Provide & fix 600x450mm MD MH cover & frame	NO	4			
	TOTAL CARRIED TO COLLECTION PAGE CIV 1					

PROPOSED CIVIL WORKS FOR LONDIANI SEED CENTRE.-KEFRI.

BILL NO 2:FOUL DRAINAGE - SOAK PIT

Item	Description	Unit	Qty	Rate	Amount	
						CTS
	SOAK PIT(1No) 50(5345) (1NO.)					
A	Excavation pit for sak pit n.e. 1.5m deep	CM	30			
B	Ditto between 1.5m and 3.0m deep	CM	4			
C	Ditto between 3.0m and 4.5m deep	CM	4			
D	Ditto between 4.5m and 6.m deep	CM	4			
E	Return fill and rum	CM	26			
F	Cartaway away surplus material	CM	16			
G	Provide materials & erect 150mm thick circular masonary wall in cement motar 1:4	SM	14			
H	Provide lay & vibrate conc. 1:2:4 to 150mm thick base	CM	3			
J	Provide lay & vibrate conc. 1:2:4 to cover slab, 150mm thick	CM	3			
K	Provide & fix 600x450mm MD MH cover & frame	NO	1			
L	Provide formwork to soffit of slab	SM	3			
M	Ditto to curved edge 150-225mm high	LM	10			
N	Provide cut bend & fix in wall dia. 8mm HT reinforcing bar	KG	62			
P	Provide approved hardcore fill to soak pit	CM	14			
Q	Make or leave rebated opening 600x450mm	NO	2			
R	Keep excavations free from general waters		ITEM			
	Soakage Area					
S	Prepare ground by digging to loosen the ground ave. depth 200mm and remove all unwanted materials and cart away as directed by the Engineer	SM	400			
R	Provide manure and mix with red soil 150mm deep all around soakage area	SM	400			
T	Provide & plant approved grass runners 300mm centres both ways & maintain until well established	SM	400			
	TOTAL CARRIED TO COLLECTION PAGE CIV 2					

PROPOSED CIVIL WORKS FOR LONDIANI SEED CENTRE.-KEFRI.						
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**	
						CTS
	PAVING SLABS AROUND THE BUILDING					
A	Remove vegetable top soil average depth 150mm and dispose off as directed by P.M.	SM	130			
B	Provide, lay and compact 100mm thick approved murram base	SM	130			
C	Treat the surfaces with approved herbicide, with warranty of 10 years	SM	130			
D	Provide, lay and compact 50mm concrete (mix 1:4:8) blinding.	SM	130			
E	Provide, lay and joint in cement sand mortar 1:3 600 x 600 x 50mm precast paving slabs. Drg. (50) 5353.	SM	130			
	TOTAL CARRIED TO COLLECTION PAGE CIV 3					

PROPOSED CIVIL WORKS FOR LONDIANI SEED CENTRE.-KEFRI.						
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**	
						CTS
	FOUL DRAINAGE EXCAVATION(all provisional **High grade soil, waste and vent pipes as "key terr-ain" P.V.C soil waste and vent pipes including couplings and all fixing brackets. To nearest manhole**					
A	Excavate trench for 150mm diametre drain pipe not exceeding 1.5M deep and average 500mm deep including fitting in, compacting, grading bottoms and desposing surplus soil.	Lm	60			
B	Ditto average 750mm deep ditto.	Lm	20			
C	Extra-over for excavating in rock class ''A''	Cm	10			
D	Allow for cutting trees along the line, grub out roots and despose off girth 600-900mm	No.	3			
	TOTAL CARRIED TO MANHOLES					

PROPOSED CIVIL WORKS FOR LONDIANI SEED CENTRE.-KEFRI.						
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**	
						CTS
	Balance carried forward **MANHOLES(all provisional)** **The following in 12 No. Manholes class "B" All provisional**					
A	Excavate manhole pit not exceeding 1.5m deep.	Cm	27			
B	Return, fill-in and consolidate excavated materials around manhole walls.	Cm	15			
C	Remove surplus excavated materials and deposit on site as directed.	Cm	12			
D	Extra-over excavation for excavating in rock class'A'	Cm	6			
E	150mm thick mass concrete 1:3:6 in manhole base.	Sm	27			
	Precast Concrete					
F	100mm thick precast conrete 1:2:4 in manhole cover slab size 1380mmx1180mm, reinforced with 8mm diametre at 80mm centres both ways with rebated opening for 450x600mm cover and frame finished smooth including any necessary formwork.	Sm	12			
	Benching					
G	Concrete 1:3:6 in benching to bottom of manholes internal size 1000mmx800mm including haunching to a height of 200mm above channel and rendering in cement 1:2 trowelled smooth.	No.	12			
	TOTAL CARRIED TO FOUL DRAINAGE					

PROPOSED CIVIL WORKS FOR LONDIANI SEED CENTRE.-KEFRI.						
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**	
						CTS
	Balance carried forward					
	Make or leave hole through 200mm concrete wall for 150mm diametre pipe(m.s) built-in and make good walls and render all round.	No.	24			
	Extra-over benching to forming the following channels with external rounded angles with slopping top of benching:-					
	150mm diametre half-round section straight main channel 900mm long.	No.	12			
	Ditto but curved 900mm long.	No.	12			
	150mm thick masonry block walling in cement sand mortar 1:3.	Sm	72			
	12mm thick cement sand 1:2 plaster to ditto with approved water-proofing admixture to internal sides of manholes trowelled smooth.	Sm	54			
	Ditto but render to top and sides of cover slab and walling.	Sm	16			
	Fiber manhole cover size 600mmx450mm and setting frame in cement sand mortar 1:3 and cover in grease.	No.	12			
	Extra over formworks boxing to form opening for manhole cover(m.s)	No.	12			
	TOTAL CARRIED TO FOUL DRAINAGE					

PROPOSED CIVIL WORKS FOR LONDIANI SEED CENTRE.-KEFRI.						
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**	
						CTS
	Balance carried forward					
	<u>The following in french drains as per standard drawing No.(50) 5344, average 5Lm</u>					
A	Excavate trench for french drains, not exceeding 1.5m deep starting from original ground level	Cm	4			
B	Extra-over excavation for excavating in rock class 'A'	Cm	3			
C	Cart away excavated materials from site.	Cm	2			
D	Trim sides of french drain to slope.	Sm	12			
E	20-60mm crushed stones or washed gravel.	Cm	2			
F	Back filling selected excavated soils mean thickness 350mm	Cm	1			
G	Imported 200mm thick compacted murram	Cm	1			
H	500 gauge polythene sheet.	Sm	6			
I	150mm diametre agricultural or perforated upvc pipe laid to falls in units of 450mm lengths with 10mm open joints covered to top half with 100mm width paper.	Lm	6			
	TOTAL CARRIED TO COLLECTION PAGE CIV 4					

PROPOSED CIVIL WORKS FOR LONDIANI SEED CENTRE.-KEFRI.						
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**	
						CTS
	SUMMARY					
1	15,000 LITRES(50PERSONS) SEPTIC TANK					
2	SOAK PIT 50(5345) (1NO.)					
3	PAVING SLAB AROUND THE BUILDING					
4	FOUL DRAINAGE AND PROVISION OF 12No. MANHOLES					
	SUB- TOTAL……..					
	TOTAL FOR CIVIL WORKS CARRIED TO GRAND SUMMARY					

PROVISIONAL SUMS

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	PROVISIONAL SUMS **The Contractor shall include in his tender the following to be deducted in whole or in part as directed by the Project Manager.**				
B	Allow a contigency sum of Kenya Shillings One Million (Kshs. 1,000,000.00).	Item			1,000,000.00
	TOTAL - PROVISIONAL SUMS CARRIED TO GRAND SUMMARY			**KSH**	

GRAND SUMMARY

ITEM	DESCRIPTION		SHS	SHS
	PROPOSED CONSTRUCTION OF SEED CENTRE FOR KEFRI AT THE RIFT VALLEY ECO-REGION RESEARCH PROGRAMME (LONDIANI REGIONAL-CENTRE)		**FOR OFFICIAL USE**	**FOR CONTRACTORS USE**
	GRAND SUMMARY	**PAGE**		
1	PARTICULAR PRELIMINARIES	PP/10		
2	GENERAL PRELIMINARIES	GP/.14		
3	BUILDERS WORKS	BW/18		
4	ELECTRICAL INSTALLATION WORKS	F/8		
5	MECHANICAL INSTALLATION WORKS	MW/50		
6	EXTERNAL WORKS	EW/2		
7	CIVIL WORKS	CIV/8		
8	PROVISIONAL SUMS	PS/1		
	TOTAL CARRIED TO FORM OF TENDER KSHS			

Amount in words Ksh ……

…….

CONTRACTORS NAME ,……..

ADDRESS ,……

,…….

DATE ,……

SIGNATURE ,……...

WITNESS'S NAME ,……..

ADDRESS ,……..

,…….

DATE ,……

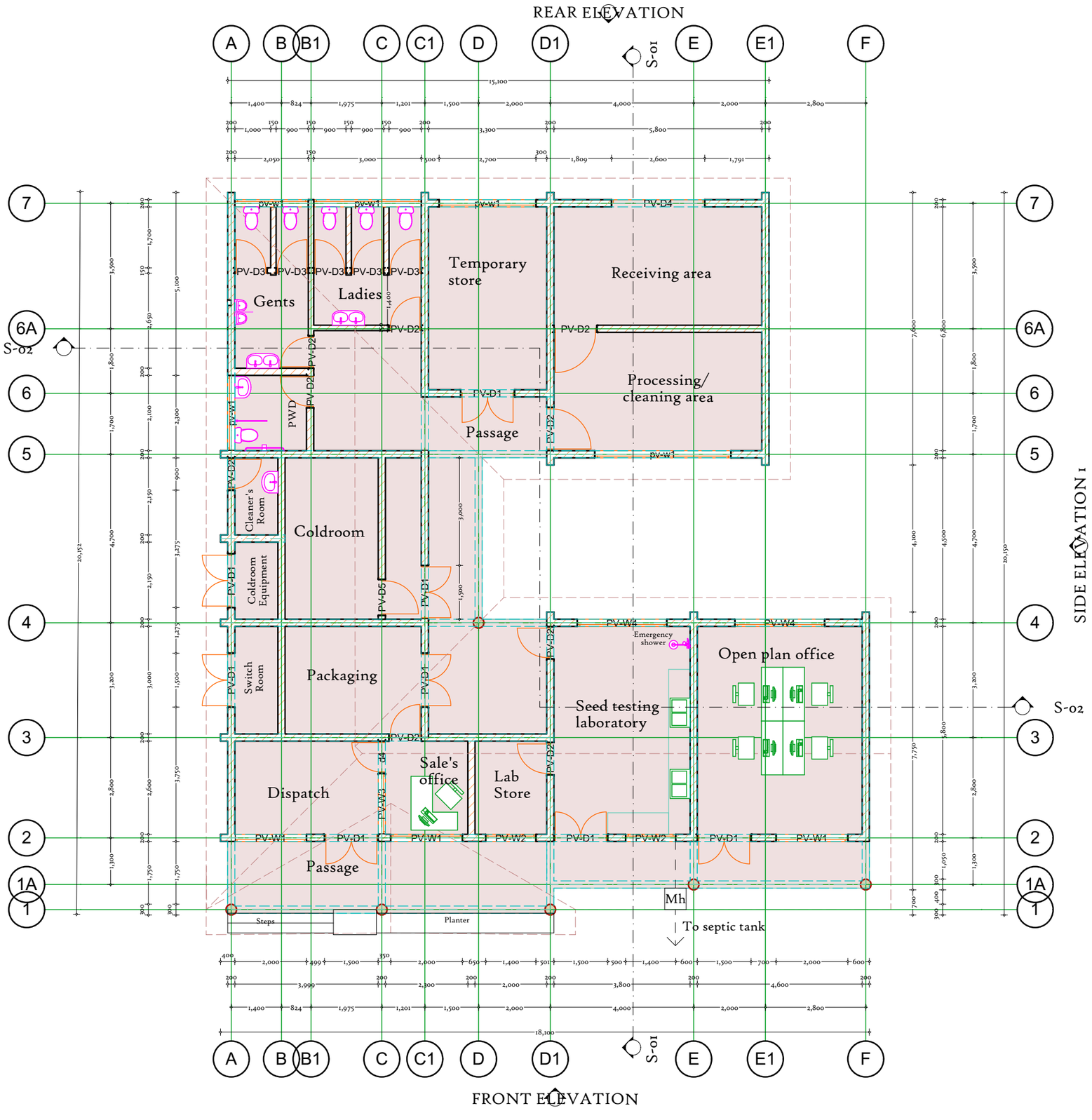
SIGNATURE,……...

REAR ELEVATION

FRONT ELEVATION

SIDE ELEVATION 2

SIDE ELEVATION 1



NOTES

general

This drawing is to be read in conjuction with engineers' drawings
All dimensions are in mm unless otherwise specified,
drawings are not to be scaled. Only figured dimensions to
to be used. The contractor must check & verify all the
dimensions before commencement of the work.

construction

All slabs at ground level to be layed over 1000 gauge
polythene sheeting on 50mm thick murram blinding on
well compacted hardcore. All soils under slabs & around
external foundation to be poised for the termites control.

structural

All black cotton soil to be removed from below all
building & paved surfaces. All paved surfaces to be
clear of black cotton soil to a distance of 500m
outside the edge of the surface.

For all R.C works, refer to SE's details.
Foundation depths to be determined on site to the SE
approval. All walls less than 200mm thick to be reinforced
with hoop iron at every alternate course.
All adjacent R.C work and masonry walls to be tied
with strap irons at every course.

mechanical

All plumbing & drainage work to comply with P.H specifications.
All surface ducts to be accessible from all floors.
S.V.P denotes soil vent pipe and to be provided at the head of
the drainage. Drains passing beneath buildings and driveways
to be encased in 150mm concrete sorround. All underground
foul & waste drain pipes shall be of PVC. to comply with BS5255.
All inspection chambers covers and framing shall be cast iron
to comply with BS.497 Table 2 Grade A.
The storm water drain pipes to comply with BS. 556.
Minimum slope in the drain pipes to be 1%
No chases for pipes will be allowed in the slabs.
Sleeves will be allowed with written approval from the SE
No cutting of concrete without express approval of the Architect,
or SE. All testing of pipes must be cordinated with electrical
& any conflicts must be clarified before works begins.
P.V denotes permanent vents.

electrical

All conduits must be laid before plastering.

fire fighting

Provide a 1130 litres reserve tank with a booster pump
Dry risers
Provide a 1x30m hydraulic Hose-reel, on every floor.
\Provide manual/ electric break glass fire alarm system.
Provide 4x4kg litres water CO2 fire extinguishers on every floor

revisions

project
PROPOSED KEFRI SEED CENTRE

LONDIANI REGIONAL CENTRE

drawing title

Folio no.

client ministry/department
KEFRI

client signature

code

scale 1 | 2 | 3

project job no. | drawing no.

	name	signed	date
Drawn & Designed by	Arch. Yammah		
Checked by			

APPROVED
Architect LL.Mochama

Ag. Chief Architect Signed

MINISTRY OF TRANSPORT, INFRASTRUCUTURE, HOUSING &URBAN DEVELOPMENT AND PUBLIC WORKS
STATE DEPARTMENT For PUBLIC WORKS
ARCHITECTURAL DEPARTMENT

FOR THE GOVERNMENT OF THE REPUBLIC OF KENYA