

**PROPOSED RESIDENTIAL HOUSE FOR
THE SPEAKER OF THE COUNTY
ASSEMBLY OF KILIFI ON PLOT NO 328
CHEMBE/ KIBABA, KILIFI COUNTY**

**SPECIFICATIONS AND BILL OF QUANTITIES
FOR PLUMBING, DRAINAGE & FIRE-FIGHTING
INSTALLATION WORKS**

CLIENT:

COUNTY ASSEMBLY OF KILIFI,
P.O. BOX 332 - 80200
MALINDI.

ARCHITECTS:

WHINTTO ARCHITECTS (K) LTD
P.O. BOX 89253 - 80100,
MOMBASA.

LANDSCAPE ARCHITECTS:

NOOR LANDSCAPE CONSULTANTS LTD,
P.O. BOX 36874 - 00200,
NAIROBI.

QUANTITY SURVEYORS

SHELTA COST SOLUTIONS LTD,
P.O. BOX 12827 - 00400,
NAIROBI.

CIVIL & STRUCTURAL ENG.

UTMOST ENGINEERING CONSULTANTS
P.O. BOX 83660 - 80100,
MOMBASA.

ENVIRONMENTAL EXPERTS

GLOBAL EHS CONSULTING,
P.O. BOX ,
NAIROBI.

SERVICES ENGINEERS

GEDOX ASSOCIATES LTD,
P.O. BOX 64441 - 00620,
NAIROBI.

OCTOBER 2018

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INSTRUCTION TO TENDERERS

1. Tenders shall be submitted on the form of tender attached hereto and all blanks in this form and in the schedules attached to the specification shall be completed.
2. No alteration shall be made on the form of tender or in the specifications and schedules.
3. The tenderer (whether his tender is accepted or not) and all other recipients of the specification and documents shall treat the details of specification and the documents attached thereto as private and confidential.
4. The employer does not bind himself to accept the lowest or any tender and will not be responsible for or pay for expenses or losses which may be incurred by any tendered in the preparation of this tender.
5. It will be presumed that the tenderer will have visited the site, and to have taken into consideration any special difficulties and requirements not referred to herein but associated with a new plant being installed to serve a new or existing buildings, as the case maybe, and to have made allowance for such in this tender.
6. All tenderers shall return tender and all accompanying documents duly completed and enclosed in a sealed envelope marked: -

**“TENDER FOR PLUMBING, DRAINAGE AND FIRE FIGHTING WORKS FOR THE
PROPOSED RESIDENTIAL HOUSE FOR THE SPEAKER OF THE COUNTY
ASSEMBLY OF KILIFI ON PLOT NO 328 CHEMBE/ KIBABA, KILIFI COUNTY”**

The tender must be received at the address and the day stated in the covering letter.

Tenders received later than the date specified shall not be considered.

7. All items of additional information, issued to tenderers prior to the time for closing the bids, shall become a part of the Contract Documents and shall be included in the proposals.
8. The tenderer shall, where applicable, provide leaflets and catalogues giving technical and physical details of the fittings being offered by him as an integral part of his bid.
9. Unless otherwise specified in the particular specification, Tenderers shall assume that all fittings required will be import duty paid.

FORM OF TENDER

Dear Sir / Madam,

RE: TENDER FOR PLUMBING, DRAINAGE AND FIRE FIGHTING WORKS FOR THE PROPOSED RESIDENTIAL HOUSE FOR THE SPEAKER OF THE COUNTY ASSEMBLY OF KILIFI ON PLOT NO 328 CHEMBE/ KIBABA, KILIFI COUNTY

Having examined and understood all the drawings, specifications, conditions of contract, Bill of Quantities and all other relevant documents for the above works and having obtained all the necessary information affecting this tender, we the undersigned hereby offer to execute and complete to the satisfaction of the Engineer the whole *Plumbing, Drainage And Fire Fighting Works* herein stated for the sum of Kenya Shillings: -

.....
.....

(Kshs: -.....)

We undertake, if this tender is accepted to execute a formal Contract Agreement with the client in the terms shown in the tender documents and to submit the name of an approved surety who will be willing to be bound to the client for the said works in an amount equal to 10% of the contract amount.

We understand and agree that the employer is not bound to accept the lowest or any tender.

Our offer is valid for acceptance within ninety (90) days from the date of this tender.

Signed: Date:

Completion Period:

Name and Address with Official Stamp:

Witness:

Signed:

Address:

Date:

FORM OF BOND

To be used with Agreement and Schedule of Conditions of Building Contract.

KNOW ALL MEN BY THESE PRESENTS that we _____ SURETY)

Of _____

ARE BOUND to (MAIN-CONTRATOR) Of _____

In the sum of Kenya Shillings. _____

_____ (Kshs. _____)

to be paid by us to the said _____

(MAIN- CONTRATOR) WHEREAS by an agreement in writing dated _____

(SUB-CONTRATOR) of _____

Sub-Contracted with the said _____ (MAIN-CONTRATOR)

to (description of works) _____

in the said agreement particularly described and conformable thereto. NOW THE condition of the above written bond is such that if the said _____ (SUB-CONTRACTOR), his / their executors, administrators or assignees shall conform to the said agreement then the above written bond to be void otherwise to remain in full force. Provided always and it is hereby agreed and declared that the liability of us to the said _____ (SURETY).

under the above written bond shall not in any way be discharged or impaired by reason of or any breach or breaches (willful or otherwise) of the said agreement committed with or without the knowledge or consent of the said _____ (SUB-CONTRACTOR)

By or on behalf of with the knowledge or consent of the said.

_____ (MAIN-CONTRACTOR)

In witness whereof we have hereunto set our hands this _____ day of _____

Two thousand and _____

Witness

Surety. Authorized by power of Attorney

(No. _____)

DEFINITION OF TERMS

Throughout this document, the following terms shall be interpreted as follows:-

| | |
|---------------------------------|--|
| Employer: | COUNTY ASSEMBLY OF KILIFI, P.O. BOX 332 - 80200 <u>MALINDI.</u> |
| Architect: | WHINTTO ARCHITECTS (K) LTD P.O. BOX 89253 - 80100, <u>MOMBASA</u> |
| Landscape Architect: | NOOR LANDSCAPE CONSULTANTS LTD, P.O. BOX 36874 - 00200, <u>NAIROBI.</u> |
| Quantity Surveyor: | SHELTA COST SOLUTIONS LTD, P.O. BOX 12827 - 00400, <u>NAIROBI</u> |
| Civil/Structural: Engineers. | UTMOST ENGINEERING CONSULTANTS, P.O. BOX 83660 - 80100, <u>MOMBASA</u> |
| Environmental Expert: | GLOBAL EHS CONSULTING, P.O. BOX, <u>NAIROBI</u> |
| Services Engineers: | GEDOX ASSOCIATES P.O. BOX 64441 - 00620 <u>NAIROBI</u> |

Contractor:

Shall mean the person or persons partnership, company whose Tender for this work has been accepted and Who has signed a Contract Agreement with the Main Contractor of which this document is forming part, and shall include his or their legal personal representatives or successors.

Contract Works:

Shall mean all the portion of the work, materials and articles, whether the same is to be used in the execution of this contract and whether the same may be on site or not.

2. **Site:**

The site of the proposed works is **ON PLOT NO 328 CHEMBE/ KIBABA, KILIFI COUNTY**

3. **Contract**

The successful tenderer will be appointed as a nominated Sub-Contractor to the main contractor under the latest edition of the Agreement and Association of Buildings Sub-contract published by the Kenya Association of Building and Civil Engineering Contractors.

The particular and preliminaries of the Bills of Quantities for the main contract where appropriate shall apply equally to the sub-Contractor who is to examine these sections of the Bills and allow for all costs incurred.

ABBREVIATIONS

| | | |
|----------|---|---|
| NO | - | shall mean number |
| m | - | Shall mean metre |
| L.M | - | shall mean linear metre |
| mm | - | shall mean millimetre |
| Kg | - | shall mean kilogramme |
| Ltr. | - | shall mean litre |
| S.S | - | shall mean stainless steel |
| G.M.S | - | shall mean galvanized mild steel |
| M.O.P.W- | | shall mean ministry of public works |
| B.S | - | shall mean the Current British standards specification published by The British standard Institution |
| C.P | - | shall mean the current British standard code of practice published together with the B.S |
| I.E.E | - | shall mean the Institute of Electrical Engineers, Savoy Place, London. |
| I.S.O | - | shall mean the International organization for standardization |
| K.B.S | - | shall mean the Kenya Bureau of Standards. |
| Ditto | - | shall mean the whole of the preceding description except as qualified in the description in which it occurs. |

PART A

PRELIMINARIES

| ITEM | DESCRIPTION | KSHS | CTS |
|-----------------------------|--|------|-----|
| A | <p>FORM OF CONTRACT</p> <p>The successful tenderer will be appointed as a nominated sub-contractor to the main contractor.</p> <p>He will be required to enter into a sub contract with the main contractor indemnifying him against the same liabilities in respect of the subcontract works as those for which the main contractor is liable to indemnify the client under the contract.</p> <p>The sub-contract Agreement shall be the latest edition of agreement and schedule of conditions of building sub- contract, published by the Kenya association of Building and civil Engineering Contractors.</p> <p>The particular and General Preliminaries of the Bills of quantities for the main contractor shall apply, where appropriate to the subcontractor who is to examine these sections and allow for all costs incurred.</p> <p>The particular and General preliminaries of the Bills of quantities for the main contract can be seen at the offices of -----by appointment.</p> | | |
| B | <p>BOND</p> <p>The subcontractor shall find and submit the name of an approved surety who will be willing to be bound to the main contractor in an amount equal to 10 % of the subcontract amount for the due performance of the subcontract up to the date of completion as defined in clause 31 of the main contract.</p> | | |
| C | <p>STAMP CHARGES</p> <p>Allow for the payment of all stamp charges in connection with the surety Bond and contract Agreement</p> | | |
| Sub total c.f to collection | | | |

PRELIMINARIES

| ITEM | DESCRIPTION | KSHS | CTS |
|------|---|------|-----|
| D | <p>TRAINING LEVY</p> <p>The contractor’s attention is drawn to legal notice No. 237 of October 1971 which requires payment by the contractor of Training levy on all Contracts of more than Kshs. 50,000 in value. Allow for all costs arising or resulting there from.</p> | | |
| E | <p>PAYMENTS</p> <p>Payments will be made through certificates to the main contractor, unless he specifically agrees to forgo this right, in which case direct payment can be made to the sub-contractor. All payments will be less retention as specified in the main contract. No payment will become due until materials are delivered to the site.</p> | | |
| F | <p>FIRM PRICE CONTRACT</p> <p>Unless specifically stated in the particular specifications this is a firm price contract and the contractor must allow in his tender for any increase in the cost of labour and /or materials during the contract period. No claim for increased costs will be entertained excepting only increased costs arising from fluctuations in duties and exchange rates as defined in condition No. 32 of the main contract.</p> | | |
| G | <p>IMPORTED EQUIPMENT</p> <p>The contractor will be required to pay full import duty and any other government taxes on all items of equipment , fittings and plant , whether imported directly for this contract or not. No advance payment will be made to the contractor by the client for the purpose of opening a letter of credit for the items to be imported or purchased locally. The contractor will therefore be expected to make his own arrangements for the opening of letters of credit and payments of taxes.</p> | | |
| | Subtotal c.f to collection | | |

PRELIMINARIES

| ITEM | DESCRIPTION | KSHS | CTS |
|------|---|------|-----|
| A | <p>TRADE NAMES</p> <p>Where trade names and / 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 acceptable.</p> | | |
| B | <p>WATER AND ELECTRICITY FOR THE WORKS</p> <p>These will be made available by the main contractor The subcontractor shall be liable for the cost of any water or electrical power used and for any installation provided especially for their own use by the main contractor.</p> | | |
| C | <p>STORAGE</p> <p>Space for storage will be provided on the site by the main contractor but the subcontractor will be responsible for the provision of any lockup sheds or stores required.</p> | | |
| D | <p>SAMPLES</p> <p>The subcontractor shall furnish at his own cost, samples, materials or workmanship that may be called for by the Architect for his approval, and any further samples in the case of rejection until such samples are approved by the Architect, and the Architect may reject any materials or workmanship not in his opinion up to the approved samples.</p> | | |
| E | <p>FOREMEN</p> <p>The subcontractor shall keep constantly on the works a competent English speaking foreman and any directions or explanations given by the contractor or the Architect to such foremen shall be deemed to have been given to the subcontractor .</p> | | |
| F | <p>MATERIALS AND WORKMANSHIP</p> <p>All materials shall be new and in all cases where the quality of goods or materials is not described or otherwise specified ,is to be the best quality obtainable in the ordinary meaning of the word ‘best’ and not merely a trade signification of that word.</p> | | |
| | <p>Sub total c.f to collection</p> | | |

PRELIMINARIES

| ITEM | DESCRIPTION | KSHS | CTS |
|------|--|------|-----|
| | <p>All materials and workmanship shall, unless otherwise specified or described conform to the appropriate British standards specification current at the date of tender.</p> <p>The subcontractor shall order all materials to be obtained from overseas immediately after the contract is signed and shall also order materials to be obtained from local sources as early as necessary to ensure that such materials are on the site when required to be used in the works.</p> <p>The contractor shall be responsible for and shall replace or make good at his own expense any materials lost or damaged. The works throughout shall be executed by skilled workmen well versed in their respective trades.</p> | | |
| A | <p>REJECTED WORKMANSHIP OR MATERIALS</p> <p>Any workmanship or materials not complying with the specific requirements or approved samples or which have been damaged , contaminated or have been deteriorated , must immediately be removed from the site and replaced at the subcontractor’s expense, as required.</p> | | |
| B | <p>CO-OPERATION BETWEEN CONTRACTORS</p> <p>Other services will be installed in the premises under separate contracts. This subcontractor will be expected to acquaint himself with the general arrangement and layout of these other services so that the accommodation , scaffolding and plant is most effectively used jointly by all contractors and further , that the building work requirements are properly indicated in good time to the main contractor.</p> <p>The subcontractor shall also cooperate with other contractors to ensure that ducts, chases, wall spaces and plant rooms are most economically used to accommodate the services which are to be installed.</p> | | |
| | Sub total c.f to collection | | |

PRELIMINARIES

| ITEM | DESCRIPTION | KSHS | CTS |
|------|---|------|-----|
| | <p>If as a result of failure to comply with this clause , it becomes necessary to remove , modify or re- install any services, to avoid impeding installation of any other services ,the installation of which the subcontractor may, in the opinion of the Architect ,reasonably have been expected to foresee, the subcontractor shall carry out such removal , modification or reinstallation at his own expense.</p> <p>PROTECTION</p> <p>A The subcontractor shall adequately cover up and protect his own work to prevent injury and also to cover up and protect from damage all parts of the building or premises where work is being performed by him under the contract.</p> <p>HANDING OVER</p> <p>B The subcontract works shall be considered complete and the defects liability period shall commence only when the subcontract works and supporting services have been tested commissioned and operated to the satisfaction of the Architect and officially approved and accepted by the employer, provided always that that the handing over of the subcontract works shall be coincident with the handing over of the main contract works.</p> <p>DEFECTS AFTER COMPLETION</p> <p>The defects liability period will be six months from date of completion of main contract as certified by the Architect.</p> <p>C DAMAGE FOR DELAY</p> <p>Liquidated and ascertained damages as stated in the main contract Agreement will be claimed against the main contractor for any unauthorized delay in completion. The subcontractor will be held liable for the whole or a portion of these damages should he cause delay in completion.</p> <p>D</p> <p>Sub total c.f to collection</p> | | |

PRELIMINARIES

| ITEM | DESCRIPTION | KSHS | CTS |
|------|---|-------|-------|
| A | <p>WORKING DRAWINGS</p> <p>The subcontractor shall prepare detailed working drawings for execution of the works. These drawings will be submitted to the Engineer for approval of the subcontractor’s proposals and designs. If not so submitted the subcontractor shall accept at his own cost the risk that any work commenced at the site may be rejected.</p> | | |
| B | <p>AS ‘BUILT DRAWINGS’ AND MANUAL</p> <p>The subcontractor shall within one month after handing over of the works , submit to the Engineer 3 sets of ‘As Built drawings’ as well as 3 copies of maintenance manuals and user’s instructions for all equipment installed. This shall be properly bound in 3 separate files each with an index of the contents.</p> | | |
| C | <p>CLEAR AWAY ON COMPLETION</p> <p>The subcontractor shall, upon completion of the works, at his own expense remove and clear away all plant, equipment, rubbish and unused materials and shall leave the whole of the works in a clean and tidy state, to the satisfaction of the Architect. On completion, all the works shall be delivered clean, complete and perfect in every respect to the satisfaction of the Architect.</p> | | |
| | <p>Sub- total c.f to collection</p> | <hr/> | <hr/> |
| | <p>COLLECTION (PRELIMINARIES)</p> | <hr/> | <hr/> |
| | <p>From page -----</p> | | |
| | <p>From page -----</p> | | |
| | <p>From page -----</p> | <hr/> | <hr/> |
| | <p>From page -----</p> <p>Total preliminaries c.f to summary of prices</p> | | |

GENERAL SPECIFICATION FOR PLUMBING INSTALLATION

1.0 GENERAL REQUIREMENTS

1.01 Introduction

This specification details the requirements for the materials supply, installation, testing and commissioning of the Plumbing and fire fighting installation as shown on the Contract Drawings.

The Sub-Contractor shall include for all appurtenances and appliances not necessarily called for in this specification or shown on the Contract Drawings but which are necessary for the completion and satisfactory functioning of the contract works.

If there is a difference between the requirements of this Specification and the Contract Drawings or lack of clarity in either specification or the Contract Drawings, the Contractor must clarify such differences with the Engineer before tendering. No claim for extra payments shall be entertained from the Contractor due to failure to comply with this requirement.

1.02 Scope of Works

The Sub-Contract works shall comprise the supply and installation of all the sanitary appliances, the internal drainage system up to the nearest man-hole outside the building, the internal cold and hot water supply and storage system, the external water reticulation system, together with the installation of the firefighting equipment all as shown on the Contract Drawings and as here-in specified.

1.03 Regulations and Standards

All the Plumbing works shall be carried out by a licensed and experienced plumber under the Government Regulations. The work shall be executed in accordance with the best principles of modern plumbing practice.

The Contractor shall be responsible for ensuring compliance with all the governing regulations and in particular, his attention is drawn to the following specific codes and regulations:-

- a) The Local Authority by-laws and regulations
- b) The current Republic of Kenya Building Code
- c) The M.O.W latest issue of "General Specification for Building Works"
- d) B.S. 5572 - Code of practice for sanitary pipework
- e) B.S. 8301 - Code of practice on building drainage
- f) B.S. 6465 - Sanitary Appliances
- g) B.S 5955 - Code of Practice for uPVC pipework
- h) C.P. 310 - Water Supply
- i) B.S. 6700: 1987 - Water supplies within buildings
- j) The I.E.E Regulation
- k) The Kenya Bureau of Standard (K.B.S) Specification

All plumbing shall be executed in accordance with Regulations of the Local Authorities and the Water Supply Companies. The Contractor shall give all Notices and pay all fees required thereunder. The amount of such fees shall be deemed to be included in the Contract Sum unless otherwise expressly stated.

1.04 Occupation Certificate

The plumbing Contractor shall upon completion obtain an "Occupation Certificate" from the Local Authority and forward it to the Engineer. The cost of obtaining the certificate shall be deemed to be included in the Contract Sum.

1.05 Materials and Standards

All equipment and materials shall be new, strong and of durable construction. All the items must meet the relevant quality standards and of reputable manufacture. Safety devices such as pressure relieve valves, thermal expansion joints, thermal and over-load protectors Etc must be installed wherever deemed necessary.

1.06 Builders Work

Holes, trenches and wall chase in building fabric to accommodate pipes, cable trays etc., together with concrete plinths for pumps, tanks etc. shall be carried out by the Main Contractor at no cost to the Sub-Contractor. However, the Sub-Contractor must inform the Main Contractor of his requirements well in advance to allow such requirements to be incorporated before casting of the building fabric. Drill holes in concrete for anchor channels, clamps, supports etc. shall be carried out by this Sub-Contractor but he must liaise with the Main Contractor before carrying out such works. The Sub-Contractor shall not make any holes nor cut the building fabric without the express consent of the Structural Engineer and consultation with the Main-Contractor.

1.07 Water meters

These shall be to BS 5728 part I and I.S. 4064/1. The meters shall be suitable for water temperature up to 30 °C and 10 bar Nominal pressure.

These shall have counter registration in cubic meters (or liters), and be able to register down to 1 litre of water volume. These shall be installed to the requirements of BS 5728 part 2 and to the approval of the local council.

The subcontractor shall on behalf of the client apply for and secure the meter connection from the Local Authority. He shall therefore allow for all the costs for permits, materials and attendance in connection thereof.

2.0 WATER SUPPLY INSTALLATION:

2.01 Galvanized Mild steel pipes

Tubing shall be galvanized mild steel to B.S. 1387, with tapered pipe thread to B.S 21:1985. These shall be medium gauges for general use and heavy gauge for underground use, with screwed and socketed joints and of approved manufacture. Tubes must be cleanly finished with smooth surfaces, free from defects and scales.

All pipes below ground are to be protected by coating with bitumen reinforced with glass fibre tissue, hessian cloth or other approved material.

Fittings shall be galvanized wrought steel to B.S 1740, with B.S. thread, or galvanized malleable cast iron to B.S. 143 and 1256, of approved manufacture, for use with galvanized steel pipes to B.S. 1387. Castings must be smooth and free from blow holes, pittings and other defects.

Where flanged connections are used, these shall comply with B.S. 4504, welded or screwed .All flanges shall withstand a Nominal pressure of 1.6 Mpa (PN 16) and shall be of either grey cast iron or steel.

Flanged joints shall have gaskets complying with B.S. 4865 part 1 of 1972, for pressures up to 6.4 Mpa (64 bars).

Galvanizing of pipes and fittings shall be to B.S. 729:1971

2.02 Copper Pipework

Copper pipes shall be used to B.S. 2871:1971 part 1, of approved manufacture. These must be solid drawn, round, clean, smooth and free from all defects and deleterious films in the bore. Fittings shall be capillary or compression type to B.S. 864:1983 Part 2, of approved manufacture, free from internal

fins and designed for minimum resistance of fluid flow. Compression fittings to be type A (Non-manipulative), unless otherwise specified.

Copper tubing is to be used as shown on the drawings and as connection tube between steel pipe work and sanitary/laboratory fittings.

In order to avoid direct contact a brass straight connector shall be positioned between the steel tube and the copper tube.

2.02 **u.P.V.C. Cold Water Service Pipe System**

Pipes shall comply in all respects with British Standard 3305:1968 and shall bear the British Standard Kite Mark together with the appropriate class colour coding at one metre intervals.

Fittings shall comply in all respects with British Standard 4346 Part 1:1969 and shall bear the British Standard Kite Mark.

Pipes shall be supplied in plain-ended lengths.

The minimum acceptable wall thickness of pipe and fittings shall be as follows:

| | |
|---------------------------|----------------------------|
| <u>12mm nominal 1.7mm</u> | <u>40mm nominal 3.1 mm</u> |
| <u>20mm nominal 1.9mm</u> | <u>50mm nominal 3.9mm</u> |
| <u>25mm nominal 2.2mm</u> | <u>75mm nominal 5.7mm</u> |
| <u>30mm nominal 2.7mm</u> | <u>100mm nominal 7.3mm</u> |

The method of jointing to be employed for dimensions 40mm and smaller shall be that of solvent welding socket using the manufacturers approved solvent cement.

For dimensions 50mm and larger the method of jointing shall be with lock-ring integral socket and coupling.

The grade of Polymer used for the pipe shall have a minimum softening point of 75 °C and for the fittings a minimum softening point of 72°C when tested by the 'Vicat' method 102J and a Tensile strength of Min. 45MN/m² at 20 °C as described in British Standard 2782:1975.

The pipes and fittings shall be colour grey.

2.03 **Valves, Taps and Ball-valves**

- a) Brass stop valves and draw-off taps (bibtaps, pillar taps combination taps Etc) shall be to B.S. 1010 Part 2:1973 or B.S. 5412; screw-down pattern, to comply to test pressure of 2.0 Mpa (20 Bars) and of approved manufacture.
- b) Draw off taps shall be of metal body with chromium plated finish unless otherwise specified.
- c) Copper alloy valves (gate, globe, stop and check valves) shall be to B.S. 5154 and tested to B.S. 5146 Part 2; 1984. These shall be with screwed, flanged or capillary compression ends. Flanged check valves shall be to B.S. 5153:1974 as type Glenfield No. 5003. The body, door cover to be of meehanite cast iron with fun-metal seat to B.S, 1400.
- d) Gate valves of sizes above 80mm shall be of cast iron wedge type to B.S. 5163:1974 as Glenfield R.S. No. 3500 series. These are of meehanite cast iron body to B.S. 1452 with rubber covered meehanite cast iron gate.
- e) Brass draining taps to be screw down pattern to B.S. 2879:1980, type A (Bushed) unless otherwise specified.
- f) Ball valves shall be of brass body and to B.S. 1212 Part 1:1953 piston type for low, medium or high pressure (3.58 bars, 7.72 bars and 12.62 bars respectively) as directed and with provision for

removable seats, supplied with copper floats to B.S. 1968:1953, or plastic floats to B.S. 2456., approximately marked.

2.04 Pipe Thermal Insulation

All exposed and under-ground hot water and chilled water supply pipes and fittings shall be adequately thermally insulated. The insulation shall be to B.S. 5422:1977, and B.S. 5970:1981. The insulation shall be pre-formed fibre-glass insulation for hot water and steam, and expanded polystyrene (styropor) in sections for chilled water.

The insulation shall be covered with proprietary cladding material or, where no proprietary material exists, with cotton canvas for indoor pipework and 0.25mm thick aluminium sheet or foil for external and under-ground piping. The sheet jointing shall be water proofed to the Engineers approval. Underground Cladding shall be finished with two coats of bituminous painting.

Pipe insulation thickness for hot water supply shall be as given in the table below; and the density of the fibre glass shall be 100 kg/c.m., and 0.045 w/m² °C declared max. Thermal conductivity.

| Pipe diameter | 15-20mm | 25-80mm | 100-200mm |
|----------------------|---------|---------|-----------|
| Insulation thickness | 20mm | 25mm | 30mm |

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

- a) Apply a coating of suitable filler until the canvas weave disappears and allows to dry.
- b) Apply two undercoats of an approved paint and finish in suitable gloss enamel to colours approved by the Engineer.

All lagging for cold and hot water pipes erected in crawlways, ducts, and above false ceilings which, shall be covered with a reinforced aluminium foil finish and banded in colours to be approved by the Engineers.

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

Hot water pipes chased in walls shall be wrapped with hair felt or tobacco paper and secure with copper wire.

2.06 Jointing of Water Supply Pipework

- a) All joints must be air tight and water tight.
- b) Compounds containing red-lead shall not be used in jointing water supply pipes.
- c) Steel pipes shall be screwed together using an approved compound/proprietary thread tape. Exposed threads above ground shall be rust-proof painted using non-toxic bituminous paint while those to be buried shall be thickly coated with bitumen.
- d) Joints of copper to steel pipes of less than 38mm diameter shall be by copper unions or union ferrules. Those of 38mm diameter and above shall be by screw, braze, or weld copper flange to copper pipe jointing to steel flange with copper allow bolts and nuts.

Before any joint is made, the pipes shall be hung in their supports and adjusted to ensure that the jointing faces are parallel and any falls which shall be required are achieved without springing the pipe.

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

- e) All water systems shall be provided with sufficient drain points and automatic air vents to enable them to function correctly

Before any joint is made, the pipes shall be hung in their supports and adjusted to ensure that the jointing faces are parallel and any falls which shall be required are achieved without springing the pipe.

Where falls are not shown on the drawings or stated elsewhere in the specification, pipework shall be installed parallel to the lines of the building 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 a position as to be difficult to reach from a short 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 allowance shall be made for the expansion and contraction of the pipework, precautions being taken to ensure that any forces 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 or Boss white proprietary compound.

2.07 Expansion Joints and Anchors

Where practicable, hot water pipework systems shall be arranged with sufficient bends and changes of direction to absorb pipe expansion providing that the pipe stresses are contained within the working limits prescribed in the relevant B.S. Specifications.

Where piping anchors are supplied, they shall be fixed to the main structure only. Details of all anchor design proposals shall be submitted to the Engineer for approval before erection commences.

When arranging piping it shall be ensured that no expansion movements are transmitted directly to connections and flanges on pumps or other items of plant.

Flexible joints shall be supplied to prevent vibrations and other movements being transmitted from pumps to the piping systems or vice versa.

All bends, valves and hydrant tee etc. in the line of the water mains shall be adequately anchored to resist thrust due to internal water pressure. A concrete block shall be cast under and the around the pipe and between it and the sides of the trench. Well rammed materials shall be used to support the pipe on either side of the concrete.

2.08 Pipe Supports and Fixings

(a) General

This sub-clause deals with pipe hangers, slider and roller type supports, clamps, cages, cantilevers Etc supports securing pipes to the structure of buildings for above ground application. These shall be manufactured to B.S. 3974.

The variety and type of supports shall be kept to a minimum and their design shall be such as to facilitate quick and secure fixings to metal, concrete, masonry or wood.

Consideration shall be given, when designing supports, to the maintenance of desired pipe falls and the restraining of pipe movements to a longitudinal direction only.

Pipes shall be fixed in a position which leaves the lower surfaces at the same horizontal level, unless otherwise instructed.

Pipes shall be fixed to true lines parallel to adjacent lines of the building unless otherwise specified.

Where insulated, pipes shall be fixed with the insulation at least 25mm clear of adjacent surfaces.

The Plumbing Contractor shall apply and install all steelwork forming part of the pipe support assemblies and make good any damage to builder's work associated with the pipe support installation.

All proposals for pipe supports shall be submitted to the Engineer for approval before any erection work commences.

b) Spacing for Pipe Supports

Pipe runs shall be secured by pipe clips connected to pipe hangers, 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 spacings in metres for steel and copper pipe and tube is given in the following table for horizontal runs.

| Size Nominal Bores | Copper Tube To B.S. 2871 | Steel Tube To B.S. 1387 |
|-----------------------|-----------------------------|----------------------------|
| 15mm | 1.25m | 2.0m |
| 20mm | 2.0m | 2.5m |
| 25mm | 2.0m | 2.5m |
| 32mm | 2.5m | 2.7m |
| 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 | 3.5m | 4.5m |
| 150mm | 4.5m | 5.5m |

The Support spacings for vertical runs shall not exceed one and half times the distances given for horizontal runs, or as given by the manufacturers.

c) Pipe Sleeves

Where pipes pass through concrete or block wall, pipe sleeves of galvanized steel tube shall be used; these shall be of sufficient sizes to give at least 3mm clearance around the pipe. The annular space shall be filled with bitumastic material and caulked at the ends.

2.09 Trench Excavation – Water Main

As described in B.S 8301 Clause 18 and the following:-

- (a) The Contractor shall excavate the pipe trenches in the line to the depths indicated by the Engineer. Except where otherwise indicated on the drawings or directed by the Engineer, all pipes must have a minimum cover of 500mm over top of the barrel of the pipe when laid, plus or minus a tolerance of 75mm either way. All trenches shall be excavated in open cuttings.

- (b) Where the trench passes through grassland, arable land or garden, whether enclosed or otherwise, the turf, if any, shall be pared off and stacked, and the productive soil shall be carefully removed from a width of 600mm greater than the normal trench width, or equal to the overall width of track of the excavating machine whichever is greater, and laid aside to be subsequently used in reinstating the surface of the ground after the trench has been refilled.
- (c) The bottom of the trench shall be properly trimmed off, and all low places or irregularities shall be levelled up with fine material. Where rock or large stones are encountered, they shall be cut down to a depth of at least 75mm below the level at which the bottoms of the barrels of the pipes are to be laid, and covered to a like depth with fine material (sand or red soil) so as to form a fine and even bed for the pipes.
- (d) Joint holes shall be excavated to such minimum dimensions as will allow the joints to be well and properly jointed.
- (e) The pipe trench shall be kept clear of water at all times.
- (f) The Contractor shall, wherever necessary, by means of timbering or otherwise, support the sides of the trench so as to make them thoroughly secure, and afford adequate support to adjoining roads, lands, building and property, during the whole time the trench remains open and shall remove such timbering when the trench has been backfilled. The cost of such timbering or other work shall be deemed to be included in the rates for excavation and backfilling. In case the Contractor is instructed by the Engineer to leave any portion of such timber in position, he will be paid for it accordingly.
- (g) The clear width inside the timbering, in the case of single pipes shall be at least 320mm in excess of the external diameter of the pipe being laid, in order to allow it to be freely lowered into position in the trench without damage to the external protection.
- (h) Where more than one pipe is to be laid parallel, then the clear width inside the timbering shall be at least 520mm in excess of the combined external diameters of the pipes.
- (i) Any excavation below the specified depth, in error or otherwise, shall be refilled to the correct levels, at not extra cost, with mix 1:3:6 concrete or other approved material.
- (j) If a mechanical excavator is used by the Contractor, he shall indemnify the Employer against all claims for damage which, in the opinion of the Engineer, may have been caused by the use of this plant. When a mechanical excavator issued the bottom 200mm of excavation shall be excavated by hand to ensure an even bed for the pipes.

2.10 Concrete Bedding, Haunching and Surround

Concrete bedding, haunching and surround shall be provided as necessary of where called for by the Engineer in accordance with the requirements laid down in B.S. 8301:1985 Clause 11.

2.11 Backfilling

Backfilling of trenches, shall be carried out in accordance with the methods described in B.S. 8301:1985 Clause 5.7.6.

2.12 Reinstatement of Surfaces

Following the final backfilling of all trenches and manhole surrounds, the surface of the excavated areas shall be fully reinstated to the approval of the Engineer.

Where the excavations have been carried out in public highways or other areas not forming part of the site, prices will be deemed to allow for all charges associated with the temporary and final reinstatement requirements of the Local Highway Authority.

No claims for extras in this respect will be accepted.

2.13 Identification of Pipelines

All pipes conveying fluids shall be identified by applying the basic identification colours or the colour code indication as specified in B.S. 1710. The following table is given as a guide.

| Pipe Contents | | Basic identification colour |
|---------------|---------------------------|-----------------------------|
| 1. | Water | Green |
| 2. | Drainage | Black |
| 3. | Steam | Silver Grey |
| 4. | Fire extinguishing | Red |
| 5. | Compressed air and vacuum | Light Blue |
| 6. | Oils | Brown |
| 7. | L.P.Gas | Yellow |

The method of application shall be as here-in specified and/or shown on the drawings.

2.14 Lettering

The lettering for sluice valves, fire hydrants, air valves and washouts abbreviated SV, FH, AV and WO respectively shall be in accordance with the normal practice and as details shown on the drawings and colour coded as above with letters in white or black on the appropriate background colour.

2.15 Surface Boxes

Sluice valves, air valves and fire hydrants shall be covered with surface boxes in accordance with details as shown on the drawings. In roads and footpaths the boxes shall be laid flush with the surface.

2.16 Water Supply Pipework Testing

The whole of the water supply system shall be tested to the approval of the Engineer as follows:-

Plug-off valves of main service line and/or terminals in the section to be tested.

Fill pipes with drinking water and apply test pressure which shall be the maximum working pressure plus 50%, or as directed by the Engineer.

There must be no measurable loss of pressure at the end of one hour and system must be water tight.

Open all taps and check for satisfactory rate of outflow.

Test all cisterns as directed, at pressure not less than the working pressure.

Locate and make good all defects and re-test to the satisfaction of the Engineer.

2.17 Testing – Mains Installation

- (a) The test pressure shall be one and a half 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 as in the case of the cast or spun iron pipes, where the test pressures should not exceed 120, 180 and 240 metre/head for Clause B, C, or D pipes, respectively.

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.

- (b) When a section of the main has been jointed, the ends shall be closed with caps, plugs, or flanges which must be strongly strutted against a solid surface to the satisfaction of the Engineer. The trench shall be properly backfilled and rammed as herein specified, and as shown on the drawings, for its whole length so as to cover the main to a depth of not less than 500mm, except at the joint places which shall be kept clear of all backfilling, if necessary by the use of timbering, so that each joint is left fully exposed for inspection. No backfilling of joints will be permitted before testing of each section.

As long as a section of main as possible shall be tested at one time subject to the maximum length of open trench approved by the Engineer or permitted by the Highway Authority, and the test shall be carried out within 12 working days of the completion of such sections of mains.

Where a main is laid across a road or in such a position as to interfere seriously with the normal use of the road, the Contractor may, with the consent of the Engineer and at his own risk, fill in such joint holes as may be necessary. He shall, at his own expense, re-excavate any or all joint holes necessary to locate a leak and carry out repair work should the results of his hydraulic test prove unsatisfactory.

The section shall then be filled with mains water, great care being taken to drive out all air through air valves, ferrules or otherwise to the approval of the Engineer.

- (c) After the section to be tested has been charged and all air liberated it shall remain standing under moderate pressure for several days for final airing.

The leakage from the mains and connections from each section tested shall not exceed 4 litres of water per 25mm diameter of main, per 2 km length each 24 hours, every 30 metres head of pressure, and any visible individual leak shall be repaired.

To determine the rate of leakage, the Contractor shall furnish a suitable hydraulic test pump, pressure gauge, connections and water meter or other appliance, for measuring the amount of water pumped.

If the leakage to be at a greater rate than that specified the Contractor shall re-excavate the trench where necessary and shall remake the joints and replace defective work until the leakage shall be reduced to the allowable amount.

- (d) The Employer shall charge the Contractor the cost of any couplings required to join up tested lengths of main if, in the Engineer's opinion, greater lengths could reasonably have been tested or if failure under test requires the pipe to be cut, or other methods of laying should have been adopted.

Water used by the Contractor in testing the main shall be supplied by the Main Contractor. The Contractor shall carry out all work which may be necessary for making temporary connections to the existing mains to obtain water for testing at his own expense.

- (e) In carrying out the test for water tightness the Engineer only shall authorize the operation of all valves, but the Contractor shall provide all the necessary labour to assist in the opening and closing of the valves to the Engineer's instruction, and he shall allow in his prices for all his expenses in connection with testing on completion.

The Engineer shall be the sole judge of water tightness.

2.18 Sterilization of Installation

After testing, all the water supply system shall be sterilized before taking into use, and after being opened up for any repairs.

Sterilizing shall be done in accordance with C.P. 310:1965 Clause 409, or as detailed below, to the satisfaction of the Engineer.

- a) Fill the whole system with drinking water and flash out.
- b) Re-fill the system, adding sterilizing chemical gradually as the storage cistern fills. Use proprietary chemicals or bleaching powder at the rate of 0.15 kg per 1000 litres.
- c) When the cistern is full, open the taps successively working away from the cistern, and closing each tap as the discharge begins to smell chlorine.

- d) Top up the cistern with water and the sterilizing chemical and leave still for 24 hours.
- e) Empty system and flush-out thoroughly with clean water.

2.19 Cleansing and Sterilizing the Mains

When a pipeline is complete and where applicable, has successfully passed the test, it shall be thoroughly washed out using, if possible an open end. Thereafter it shall be sterilized by being filled with a suitable solution containing not less than 20 p.p.m of free available Chlorine or such other sterilizing agent, as the Engineer shall prove. After standing for 24 hours the main shall again be washed out and refilled with main water prior to the taking of bacteriological samples. The Contractor shall provide all necessary stop ends, fitting and chemicals for this work.

Empty and washing out of the pipes shall be done in such a manner as not to damage the trench or cause flooding, and the Contractor shall supply and use such piping, specials and/or hose as may be necessary to facilitate the flow of water to the nearest drain or watercourse. Water used for washing out and sterilizing will be supplied by the Main Contractor.

Before any section of the main is put into use a bacteriological sample or samples will be taken in the presence of the Engineer and only on receipt of satisfactory certificate from the Medical Research Laboratory will the main or section of main be permitted to be put into supply and be considered as having been substantially completed.

Any expenditure involved in providing facilities or materials for the taking of samples shall be included in the Contractor's tendered rates and the Engineer will specify and shall be the sole judge as to the number of samples required and the points at which they are to be taken.

The cost of the bacteriological examination will be borne by the Employer but if the sample or samples are not satisfactory the cost of any subsequent analysis will be borne by the Contractor.

2.20 Existing Installation

Where pipes for cold water are to be connected up to existing installations, the condition of the existing installation it to be reported to the Engineer in order to establish if part of the existing installations is to be replaced or serviced. The Sub-Contractor shall allow for keeping the services in use with minimum interruptions. All service interruptions must be reported and agreed to with the client at least 24 hours in advance.

2.21 Clearance of the Site

The Contractor shall remove all surplus pipes, specials and other fittings from the site, upon completion of the works and prior to handing over. The site of works shall be levelled and all surplus excavation, debris, cut trees or bushes shall be carted to approved tip sites.

3.08 Booster Pumps

These will comprise of 2 No. Electrically driven pumps, one for duty and one for standby. The pump vital parts (seal drivers, head cover, intermediate chamber, impeller, shaft, washer outer sleeve etc.) shall be in stainless steel, with tungsten carbide seal ring and cast iron pump head and a maintenance free mechanical shaft seal. This shall be coupled to a totally enclosed squirrel cage 2 pole fan cooler motor.

Flange connections on each pump are to be BS 4504NP.16.

Each pump is to be supplied with isolating valves, non-return valves and test cocks on the pump body, all as shown on the drawings or elsewhere in this specification.

The pump and motors are to be assembled on a mild steel fabricated support base plate which is to be bolted down to a concrete plinth in an approved manner.

Flexible coupling with flange connections are to be supplied and fitted to both suction and delivery pipes to reduce pump vibrations being transmitted via the connection pipework.

3.09 PUMP CONTROL PANEL

The control panel shall house the pump motor starters, selector switches, alarm devices and overload protection gear together with a micro-door switch to isolate all power upon opening the panel door.

The panel shall be fabricated from heavy duty sheet steel with stove enameled finish and clear Perspex front cover, forming a dust and damp proof enclosure.

All control buttons and indicator lights shall be mounted on the panel door and suitably labelled and shall include the following:-

- a) Main isolator switch
- b) Pump No. 1 switch on push button
- c) Pump No. 2 switch on push button
- d) Automatic and manual change-over switches
- e) Pump running (green light) indicator light for each pump
- f) Pump failure

DRAINAGE SYSTEM

4.0 DRAINAGE SYSTEM MATERIALS AND WORKMANSHIP

4.01 Cast Iron Spigot and Socket Pipes

These shall conform to B.S. 416:1973 for above ground pipework and of approved manufacture. Castings must be sound and free from defects, and must ring clearly when struck with a light metal hammer. All pipes and fittings to be coated with tar or bitumen based solution suitable for tropical conditions by the manufacturer.

Jointing shall be by packing the joint space with a gasket of firmly caulked tarred yarn, then caulked with molten lead or fibrous lead yarn.

Cast iron socketed pipes shall generally be supported at every socket joint by means of either holderbats secured rigidly to the structure, or purpose made straps for attachment to rigid steel support brackets.

When holderbats are used, they shall conform to the requirements of B.S. 416.

Suitable anchors shall be provided at all changes of pipe direction, junctions and tees, to counteract the effect of end thrust loads.

All cast iron pipework, branches, tees, bends and other fittings shall be supplied complete with inspection covers for cleaning purposes. These inspection covers shall be included as part of the fittings and shall comply with the requirements of B.S. 146.

4.02 u.P.V.C. Soil and Water System

The pipes and fittings shall comply in all respects to B.S.S. 4514 and B.S 5255 and shall where appropriate bear the British Standard Kite Mark.

Pipe will be supplied in plain ended lengths.

The minimum acceptable wall thickness of pipe and fittings will be as follows:-

| | |
|-------------------|---------------|
| <u>32mm pipe</u> | <u>1.8mm</u> |
| <u>40mm pipe</u> | <u>1.9mm</u> |
| <u>50mm pipe</u> | <u>2.0mm</u> |
| <u>80mm pipe</u> | <u>3.20mm</u> |
| <u>100mm pipe</u> | <u>3.20mm</u> |
| <u>150mm pipe</u> | <u>3.30mm</u> |

The method of jointing to be employed shall be that of solvent welding using the manufacturers approved cement. Seal ring fittings shall be used where necessary to accommodate thermal movement, or the sockets of standard fittings shall be converted to seal ring joints by the addition of a seal ring adaptor.

The grade of Polymer used for the pipe shall have a minimum softening point of 82 deg. C and for the fittings a minimum softening point of 79 deg. C when tested by the 'Vicat' method 102D as described in British Standard 2782:1975.

The pipe and fittings shall be colour grey, to British Standard 5252:1976, 10.A.07 with the exception of water closet connections, which may be colour white.

The rubber seals for seal ring joint shall be of 'W' section and shall be to the material requirements of British Standard 2494:1976. Water closet connections shall be to the same British Standard.

Water boss connections when fitted to pipes shall consist of two parts with inner and outer flanges, solvent welded as a complete unit with inbuilt gradients for the waste pipes of 1.25 degrees. Where it is not possible to gain access to the bore of the soil pipe, self-locking bosses with integral clamping action may be used provided that the mating surfaces are suitable for and used with solvent weld cement.

Water boss connections to branch fittings as necessary shall be solvent welded to set positions of its branch fittings.

Alternative waste boss connections may be made using unequal junctions conforming to British Standard 4514:1969 with solvent weld joints conforming to the same.

Holderbats shall be made of mild steel protected from corrosion by galvanizing. They shall have a two position fixing suitable for either acting as pipe support but allowing thermal movement or as a clamp fit on a fitting creating a fixed point. For optimum fit to pipe supports P.C.V packing pieces may be used.

Access shall be provided when necessary either by means of an integrally moulded door in an access fitting with an externally fitted rubber seal and secured with two galvanized bolts and nuts or alternatively two-piece clamp type door fitted into the pipe run. The system shall be as described in a 'Product Handbook' complying with the recommendations of B.S. 4940:1973.

4.03 u.P.V.C. Rainwater Fittings

All fittings shall be injection moulded and shall be compatible with pipes and gutters/

All gutters, pipes and fittings shall be colour grey to British Standard 5252:1976 10.A.07, or black or white.

Gutter connecting fittings shall have integrally moulded seal retaining cavities housing a polychloroprene seal of hollow section.

The fittings shall incorporate a gutter retaining clip:-

Gutter connecting fittings shall incorporate provision for fixing the fascia boards, rafters or blockwork such that the fixing screws shall not be in contact with the inner surface of the gutter and shall have provision for expansion of the gutter clearly marked in the fitting.

The grade of Polymer used for pipes and fittings shall have a minimum softening point of 75 deg.C when tested by the 'Vicat' method 102J as described in the British Standard 2782:1975.

Gutters shall be supported on support brackets at one metre centres.

Gutters shall be installed to accommodate thermal movement.

Expansion joints shall be provided at maximum 4 metre centres.

All rainwater system shall be installed in accordance with the manufacturer's site work instructions.

4.04 u.P.V.C Underground Drainage System

The pipes and fittings shall comply in all respects to British Standard 4660:1973 and shall bear the British Standard Kite Mark.

Pipes shall be supplied in plain ended lengths.

The minimum acceptable wall thickness of pipe and fittings will be as follows:-

| | |
|---------------------|---------------------------|
| 80mm pipe | 2.25mm |
| 110mm pipe | 3.2mm |
| 160mm pipe | 4.10mm |
| 80mm junction | 3.2mm |
| 110mm junction only | 3.50mm socket 3.80mm body |
| All other fittings | 3.20mm socket 3.40mm body |
| 160mm all fittings | 4.30mm socket 4.70mm body |

The method of jointing to be employed shall be solvent weld or lip-seal socketed fittings. Jointing to other materials shall be made in the manner specified by the manufacturer.

The grade of polymer used for the pipe shall have a minimum softening point of 82 deg. C when tested by the 'Vicat' method 102D as described in British Standard 2782:1975, and for fittings 79 deg.C.

The pipes and fittings shall be of colour golden brown approximating to British Standard 381C:1971 No. 414. The seal retaining caps and seal rings shall be black.

The rubber for lip seal joints shall be to British Standard 2494:1976.

The base of soil and vent stack connection to the below ground drain shall be made with a bend of minimum centre line radius 250 mm.

Minor changes of direction where permitted shall be made with a variable bend.

Where pipes are laid under floor slab, these shall be laid on 150mm thick concrete class "15" (1:3:6 mix) bed on full width of trench or min. 400mm wide, and the pipe shall be completely surrounded with similar concrete thickness. In all other cases, the pipes shall be laid on prepared ground in trench and backfilling to manufacturer's recommendations. Pipes shall not be left exposed to the sub during construction period.

4.05 Waste Fitment Traps

a) Standard Traps

These shall be generally of the same diameter and material as the waste outlets to which they are connected to or as specified on the drawings. All wastes shall comply with B.S. 3380.

Wastes connected to main drains through an intermediate gully trap may have a trap with a minimum water seal depth of 40mm. All other traps shall have a water seal of minimum depth – 75mm. Bottle traps shall not be used for waste connections to sinks.

Copper and copper alloy traps shall be case, solid drawn or hot formed to B.S. 1184.

Plastic traps shall be B.S. 3943, of approved manufacture. These and the uPVC pipe work must be supplied by the same manufacturer.

b) Anti-Syphon traps

Where specified, anti-syphon traps shall be as manufactured by “Caradon Terrain Ltd”, self-resealing type or by “Marley Extrusions Ltd”, Anti-syphon type, or equal and approved.

4.06 Sealing off Existing Drains and Manholes

Existing foul, surface water and sub-soil drains exposed during progress of work are to be reported to the Engineer. Where not required to be reused seal off with concrete or grout solid as directed. Seal off connection to manholes, demolish walls to 500mm below surrounding ground level and fill remainder of manhole with consolidated approved rubble and cover to level of surrounding ground as directed.

4.07 Drain Trenches

Excavation of trenches shall be made to such depths as shall be required to obtain proper falls and firm foundation. No permanent construction shall be commenced on any trench until the excavation has been approved by the Engineer. Where trenches have been excavated below the required depths they shall be re-filled to the correct level with Class “10” mass concrete (1:4:8 mix) for indoors and compacted granular or other approved fill for outdoors. Backfilling of the pipe trenches shall be by soft material free from stones and shall be watered and carefully tamped over and around the pipe concrete surround in 300mm layers until they are covered to a depth of 600mm. Subsequent filling is to be in 150mm layers, watered and rammed.

4.08 Cast Iron Man-hole Covers and Frames

Covers and frames shall be to B.S. 497, of approved manufacturer. Covers are to be cleanly cast, free from air-holes, sand holes and voids, and to fit well in the frame. Covers and frames shall be coated using hot applied coal-tar based material complying with B.S. 4164:1980.

Unless otherwise specified, covers are to 600 x 450 mm, single or double seal, flat type or recessed top for light or medium duty as specified on the Contract drawings.

Heavy duty as “East Africa foundry works”

Medium duty (Grade B): Minimum weight 143 Kg.

Light duty (Grade C): Minimum weight 37 Kg.

Step irons for deep man-holes, where specified shall be of cast iron to B.S. 1247.

4.09 Sundries

Galvanized steel wire balloons shall be B.S. 416, table 22, of approved manufacture. Vent cowls, weathering slates and aprons for uPVC piping shall be supplied from the manufacture of the plastic pipework's system.

Fixing of all pipework shall be by holder-bats, pipe-rings and fixing clips, screwed, nailed or bolted to the structure to manufacturer's recommendations and to the Engineer's approval.

4.10 Inspection and Testing

All inspection and testing shall be carried out as laid down in B.S. 5572:1978 and to the Engineer's approval. All apparatus and water for testing shall be provided by the Contractor.

Drainage pipework shall be tested as soon as practical after erection. Concealed pipework shall be tested to approval before enclosing.

Testing shall be carried out as follows:-

- a) Carry out air-test as described in B.S. 5572, Clause 12.3.1.
- b) Carry out water test as described in B.S. 5572, Clause 12.3.2.3.
- c) Carry out performance tests as described in B.S. 5572 Clause 12.3.3.

Keep record of all tests carried out for inspection by the Engineer.

SANITARY APPLIANCES

5.0 SANITARY APPLIANCES

5.01 General

All sanitary appliances shall be installed in accordance with the best standard of modern practice as described in B.S. 6465, and to the approval of the Engineer.

The appliances shall be as here-in specified and as described on the Contract drawings. The item specification is given as a guidance only, including manufacturers reference numbers, but the Contractor shall ascertain and procure all the necessary accessories specified or not, but which are required for complete installation and proper functioning of the appliance. The Contractor shall also ensure that all items ordered comply with the general regulations, standard and by-laws as specified in this document.

Where specific items are unobtainable, the Engineer shall be entitled to reject any of the alternatives on grounds of appearance or for any other reason, notwithstanding compliance with the terms of this specification.

5.02 Protection

Protection covers for the appliances Etc shall be retained during and after fixing as far as possible.

None of the equipment for the Contract works shall be used for preparing or soaking materials for washing tools, disposing waste or for any other purpose for which they are not designed.

All appliances must be stored under cover and kept dry prior to installation.

Where existing sanitary fittings are to be removed or replaced, the fitting is to be removed with utmost care and all fittings and taps to be handed over to the Employer.

5.03 Fixing

All fixtures shall be fixed in accordance with the manufacturer with the manufacturer's recommendations and to the Engineer's approval.

Fastenings and fixings supplied by the equipment manufacturers shall be used wherever possible.

TECHNICAL SCHEDULE

The Tenderer must complete the following schedule comprehensively, indicating the names of Manufacturers and/or suppliers and unit types and must submit Technical brochures for the equipment he proposes to supply for the work.

| ITEM | MANUFACTURE & MODEL Nos. |
|--|-------------------------------------|
| 1. Sanitary Appliances | |
| 2. Stainless steel sinks | |
| 3. Wash Hand Basins | |
| 4. Taps | |
| 5. Galvanized Mild Steel pipes and fittings | |
| 6. u.P.V.C pipes and fittings (drainage) | |
| 7. u.P.V.C pressure pipes and fittings | |
| 8. Valves | |
| 9. Water Tanks | |
| 10. Laboratory Sinks | |
| 11. Hot Water Cylinders | |
| 12. Portable fire fighting units | |
| 13. Hose Reels | |

Signature: Date: 20

Tenderer

PLUMBING INSTALLATION

WATER PIPES TESTING REPORT

Project.....

Date 20.....

Foreman/Plumber

DATA RECORDED ON SITE

| | | | | | |
|---|---------------------|---------------------|---------------------|---------------------|---------------------|
| Location and Ref. Drawing: | | | | | |
| Length/Diameter of Pipe: | | | | | |
| Class/Type of pipe | | | | | |
| Test Pressure Required | | | | | |
| Water filled at – | | | | | |
| Test Pressure Reached at – | | | | | |
| Loss of Water/Pressure – Reading | 1 st Hr. | 2 nd Hr. | 3 rd Hr. | 4 th Hr. | 6 th Hr. |
| Quantity of water pumped to Retain test pressure: | | | | | |
| Allowable Quantity of Leakage | | | | | |
| Remarks | | | | | |

Signature: Date: 20
(C.O.W/R.E)

Signature: Date: 20
Foreman/Plumber

FIRE FIGHTING/PROTECTION INSTALLATION

A .PORTABLE FIRE EXTINGUISHERS

The Contractor shall supply and install portable fire extinguishers as shown on the Contract Drawings and as directed on site by the Engineer. These shall be containing an extinguishing medium of water, foam powder, carbon dioxide or halon, contained in a metal body, rechargeable or non-rechargeable. The units shall comply in all respects to B.S. 5423:1980 and B.S. 5306 Part 3, 1985.

Where fixed on the wall, an appropriate fixing method shall be used, with rawl plugs in the wall to ensure permanent fix.

Timber pegs shall not be acceptable for wall fixing. The units shall be supplied sealed to manufacturer's recommendation and the seal shall be easily breakable to facilitate quick use during fire fighting operation.

B. HOSE-REEL INSTALLATION

The Contractor shall supply and install the hose-reel fire fighting installation all as shown on the Contract Drawings and as directed by the Engineer.

The hose reels shall comply in all respects to B.S. 5274:1985; automatic type, with the reel-hose complying to B.S. 3169:1981.

Each hose-reel shall be fitted with a screw down globe valve to B.S. 1010, on the inlet to the reel.

The hose-reel booster pump shall be of centrifugal type, with a minimum capacity as shown on the drawings. The pump shall be complete with an electric motor, a pressure cylinder, a base plate together with a gate valve and a strainer on the suction side plus a non-return valve on the discharge side all as shown on the Contract Drawings.

Control for the pump shall be by a pressure switch.

Piping for the hose-reel water supply shall be galvanized steel tubing to B.S. 1387:1967, Class B with pipe threads to B.S. 21:1985. Pipe fittings shall be seamless wrought steel to B.S. 1974 Part 1, 1971.

Gate valves shall be of bronze body and solid wedge with a non-rising stem and wheel, conforming to B.S. 5154:1983, and generally as Crane type DM 160. Check valves shall be Lift type with bronze body and composition disc conforming to B.S. 5154:1983 and generally as crane type DM 118.

All hose-reel supply pipework and fittings shall be painted etching primer and two coats of red enamel paint to comply to B.S. 1710:1984. All painting shall be applied to manufacturer's instructions.

C. DRY-RISER INSTALLATION

Pipes shall be galvanized steel tubing to B.S. 1387:1967 Class B with pipe threads to B.S. 21.

Pipe fittings shall be wrought steel seamless pipe fitting to B.S. 1740 Part 1: 1971.

Flanges: steel flanges to B.S. 4504:1969 PN 16.

Fire Brigade Breaching inlet shall consist of twin inlets; each inlet consisting of 65mm diameter male instantaneous coupling to B.S. 336 with a non-return valve and a blank cap secured with a short chain.

The breaching inlet shall be enclosed in a sheet metal inlet box, finished in 'fire red' backed enamel paint, with wired glass door to B.S. 3980. The door shall be secured with spring lock such that it can only be opened from the inside by breaking the glass and releasing the catch on the lock.

The door glass front shall be clearly marked with 50mm high red lettering 'DRY RISER BREECHING CONNECTOR'.

Landing valves shall be 65mm diameter gunmetal gate pattern dry riser outlets with flanged inlets and female instantaneous outlets fitted with plugs secured by short chain and conforming to B.S 5041: Part 2:1976.

Air Release Valve shall be fixed to the dry riser terminating at least one metre above the topmost landing valve.

The above valve shall be automatic air release valve conforming to B.S. 1452.

The valve and the dry riser projecting over the roof shall be effectively earthed to prevent damage from lighting.

D. FIRE HYDRANTS

The fire-hydrant system shall comply to the requirements of B.S. 5306 Part 1.

The fire hydrants shall be of the screwdown type to B.S. 750 type 2. These shall be of meehanite cast iron body with bronze spindle rings and nut and nickel-plated mild steel bearing plate.

Units shall have discharge capacity of not less than 34 l/s (450 gal/min) at a constant running pressure of 1.7 bars.

Units shall be installed underground in a concrete block chamber with surface box manufactured from meehanite cast iron (medium or heavy traffic design as specified) all to B.S. 750. The cover shall be inscribed **F.H** and chained to the box, all as manufacturer by Glenfield Ltd., or equal, approved.

An indication plate to B.S. 3251 and of approved manufacture shall be installed at a nearby and conspicuous position.

E. SPRINKLER SYSTEM

The specification shall comply with the Fire offices (FOC) rules for ordinary Hazard Group I. This is a wet pipe system that is permanently charged with water under pressure both above and below the installation alarm (wet pipe) valve.

F. PIPEWORK

1. All pipework above ground shall be heavy grade (class C) galvanized steel conforming to BS 1387 suitable for screwing to BS 21 pipe threads.
2. Pipes laid underground must conform to BS 3505 Unplasticised PVC pipe for cold water supply.
3. Joints must be made with fittings of the manipulative compression type to BS 864 part 2 only. Pipe bending is not allowed.
4. All welding of sprinkler pipework must be carried out in accordance with the provisions of BS 2640, BS 2971 or heating and ventilating contractors' association manual-welding of mild steel pipework, except that the use of "set in type branches or sockets" and "cut and shut" or "segmented" bends is not permitted.
5. All pipework shall be given 2 coats of red paint.

6. Slope of pipes for drainage: Sprinkler pipes of installations, whether on the wet, dry or alternate system must be installed such that the system can be thoroughly drained. Sprinkler pipes must be laid to the following minimum slopes:
- Wet pipe systems -2mm in 1 m
 - Dry pipe and alternate wet and dry pipe systems with pipe diameter 50mm and above -4mm in 1 m
 - Dry pipe and alternate wet and dry pipe systems with pipe diameter less than 50mm – 12mm in 1 m.

7. Support of pipework:

The contractor shall make use of the following items to support the pipework as necessary:

- Hangers
- Fasteners
- Primary support brackets
- Pipe clips
- Sling rods
- U – bolts and
- toggles

8. Spacing and location of hangers:

There must be at least one hanger for each pipe section: the distance between hangers for horizontal and vertical sprinkler pipework shall not exceed the following:

| Nominal diameter of pipe (mm) | maximum spacing (m) |
|-------------------------------|---------------------|
| Less or equal to 65 | 4.0 |
| More than 65 and up to 100 | 6.1 |
| More than 100 and up to 250 | 6.5 |

G. PRESSURE GAUGES

1. On all installations, there must be a pressure gauge (c) fitted immediately above the alarm valve and another (b) immediately below the alarm and main stop valves.
2. Pressure gauges shall conform to BS 1780. The maximum scale value of such gauges should be of the order of 150 per cent of the known maximum pressure. Pressure gauges must have divisions not exceeding 0.2 bar for a maximum scale value of 10bar, not exceeding 0.5 bar for a maximum scale of 16 bar and not exceeding 1 bar for a maximum scale exceeding 16 bar.
3. Means must be provided to enable each pressure gauge to be readily removed without interruption of installation water supplies.

FITTINGS

VALVES

Installation control valves:

The installation must be provided with a set of installation control valves comprising:

- a) a main stop valve
- b) an alarm valve suitable for a wet system and
- c) A water motor alarm and gong.

STOP VALVES:

1. All stop valves must be right handed i.e. they must be so constructed that in order to shut the valve, the spindle must turn clockwise. The control wheels must be clearly marked showing in which direction the wheel is to be turned to close the valve. There must be an indicator also to show whether the valve is open or closed.
2. The following types of installation valves are allowed:
 - a) Gate / sluice valves designed and constructed to one or other of the following specifications or equal and approved :
 - BS 5150- cast iron wedge and double disc gate valves for general purposes
 - BS 5163- Double flanged cast iron wedge gate valves for water works purposes.
 - BS 1952-copper alloy gate valves for general purposes
 - BS 5157-steel gate valve for general purposes.
 - b) Gear operated butterfly valves designed and constructed in accordance with the following specifications or its equivalent subject to approval----BS 5155 cast iron and carbon steel butterfly valves for general purposes

BALL VALVES

Ball valves for use in connection with the incoming water main to be brass gun metal or other corrosion resistant material preferably equilibrium type to BS 1212 (1953) as GLENFIELD AND KENNEDY LTD.

All ball valves to be classified as high pressure Ball valves rated at 14.10 kg/sq. cm maximum.

CHECK VALVES

to be of cast body incorporating flanges , for service of over 54 mm nominal bore to BS 5153 (1974). Services of 54 mm nominal bore and under to be copper alloy to BS 5154 (1974).

SPRINKLERS:

The sprinklers in this installation shall be 15mm conventional pattern suitable for pendent position and a temperature rating of 68 deg. C.

BILL OF QUANTITIES

PROPOSED RESIDENTIAL HOUSE FOR THE SPEAKER OF THE COUNTY ASSEMBLY OF KILIFI ON PLOT NO 328 CHEMBE/ KIBABA, KILIFI COUNTY

BILL OF QUANTITIES FOR PLUMBING, DRAINAGE AND FIRE FIGHTING SERVICES

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|------------------------------------|---|------|-----|------------|-------------|
| | <u>PRELIMINARIES AND GENERAL CONDITIONS</u> | | | | |
| A | Provide bond as stated in the published conditions of sub-contract. | Sum | | | |
| B | Provide insurance as required in the sub contract conditions. | Sum | | | |
| C | Preparation of working drawings “As installed” record drawings. | Sum | | | |
| D | Printing of paper copies of item C above. | Sum | | | |
| TOTAL CARRIED TO MAIN SUMMARY PAGE | | | | | |

MAIN HOUSE

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|--|------|-----|------------|-------------|
| <u>SANITARY FITTINGS</u> | | | | | |
| <u>SUPPLY, DELIVER AND FIX THE FOLLOWING BATH ROOM SUIT FROM ROCA/GROHE/DURAVIT/HANGSROHE PRODUCTS.</u> | | | | | |
| WC SUITES | | | | | |
| A | 'DURAVIT" Wall- Hung W.C pan with horizontal outlet in Vitreous China to B.S 3402 comprising of WC pan , seat & cover with soft closing stainless steel hinges, Giberrits concealed Cistern with dual flush fittings . Fixing Kit, cistern fittings, connector, chrome plated dome screws, volume regulator and mounting brackets. | NO | 6 | | |
| B | 'DURAVIT" Back-To-Wall W.C pan with horizontal outlet in Vitreous China to B.S 3402 comprising of WC pan , seat & cover with soft closing stainless steel hinges, Close coupled Cistern with dual flush fittings . Fixing Kit, cistern fittings, connector, chrome plated dome screws, volume regulator and mounting brackets. | NO. | 2 | | |
| WHB | | | | | |
| C | 'DURAVIT" Countertop wash hand basin 600 x 450 mm with one tap hole, in Vitreous China, 1 1/4" pop up waste, Chain, waste, flexible tube, chrome plated bottle trap and metal handle S8910 and servicing valves | NO | 9 | | |
| TOTAL CARRIED FORWARD TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|--|------|-----|------------|-------------|
| TOTAL BROUGHT FORWARD | | | | | |
| <u>SANITARY FITTINGS: ACCESSORIES</u> | | | | | |
| <u>BASIN MIXERS</u> | | | | | |
| A | Roca " LOGICA 5272321JO" Monoblock basin mixer with flow limiter, pop-up waste and flexible supply hoses. | NO | 9 | | |
| <u>SHOWER MIXERS</u> | | | | | |
| B | Roca " LOGICA 5262338JO" Wall Mounted Shower Mixer with Automatic Diverter, with retention and wall elbow and Complete with 1.5M flexible shower Rose, handshower , swivel wall bracket and shower head, with Massage spray. | NO | 6 | | |
| <u>SHOWER COLUMN</u> | | | | | |
| C | Hangsrohe " SUNAMI MASSAGE PLUS" shower arm with shower head 4 functions rain spray, soft spray, massage jet and water saving spray | NO | 1 | | |
| TOTAL CARRIED FORWARD TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|---|------|-----|------------|-------------|
| TOTAL BROUGHT FORWARD | | | | | |
| <u>SANITARY FITTINGS: ACCESSORIES</u> | | | | | |
| TOILET ROLL HOLDERS | | | | | |
| A | ROCA "serie FASHION " Toilet roll holder No 81600900Y size 150 x 150 mm | NO | 8 | | |
| <u>BATH ROOM ACCESSORIES</u> | | | | | |
| B | ROCA "SUPERINOX " Wall soap dish in Vitreous china | NO | 8 | | |
| C | Ditto but Work top soap dish as ROCA Superinox | NO | 9 | | |
| D | ROCA SUPERINOX Chrome plated towel rail size 25 x 600mm long fixed on wall | NO | 6 | | |
| E | ROCA VICTORIA Chrome plated towel rack; wall mounted; size 625 x198 x 135mm or equal and approved. | NO | 1 | | |
| F | Wall mounted glass holder as ROCA Superinox | No. | 9 | | |
| G | ROCA "superinox 600mm " shelf in Chrome plated or stainless steel finish | NO | 6 | | |
| H | Towel Ring as ROCA superinox 210mm | NO | 9 | | |
| I | Wall mounted brush holder as ROCA Superinox | No. | 8 | | |
| <u>WALL MIRRORS</u> | | | | | |
| J | Bevelled edge polished Rectangular glass mirror size 1800 x 650 x 6mm thick Ref No. 812183000 with silver backing with chromium plated dome shaped nuts and brass screws plugged. | NO | 1 | | |
| K | Ditto but 900 x 600mm | No | 6 | | |
| TOTAL CARRIED FORWARD TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|--|------|-----|------------|-------------|
| TOTAL BROUGHT FORWARD | | | | | |
| <u>SHOWER TRAYS & CUBICLE SCREENS</u> | | | | | |
| A | A straight 1600 x 1200mm DAIQUIRI acrylic shower tray Complete with frameless shower cubicle with sliding folding door screen | NO | 5 | | |
| B | A straight 1800 x 1200mm DAIQUIRI acrylic shower tray Complete with frameless shower cubicle with sliding folding door screen | NO | 1 | | |
| <u>CORNER BATH TUBS</u> | | | | | |
| C | 1800 x 1800mm Corner bath as DURAVIT with an integral arm rests, top fixing chrome anti-slip base and sound insulated white in colour and complete with ROCA chrome plated wall mounted bath/shower mixture automatic diverter 1.7m flexible shower hose hand shower swivel & bath mounted | No | 1 | | |
| D | Cascade bath tub as Duravit complete with corner bath panel,tapis auto bath waste & overflow,Hansgrohe Focus E2 bath mixer wall type and Hansgrohe Croma 100 Multi 0.65m shower kit & rail | NO | 1 | | |
| E | Bidet complete with Spout as Duravit and Hansgrohe respectively | No | 1 | | |
| TOTAL CARRIED FORWARD TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|-------------------------------|---|------|-----|------------|-------------|
| TOTAL BROUGHT FORWARD | | | | | |
| <u>Kitchen sinks</u> | | | | | |
| A | Stainless steel inset sinks, double bowl double drain sink 1500 X 550mm with two tap holes No. 876471165. Complete with monoblock sink mixer,high swivel spout aerator Ref AMURA 526172370 ,flexible supply hoses and unslotted pop up chrome waste plate | NO | 5 | | |
| B | Stainless steel Dhobi sinks as ASL 600 x450 mm | NO | 2 | | |
| C | 10 litres 4 Kw under sink instantanous water heater as ARISTON or Equal | NO | 1 | | |
| D | 40 Gallons HWC with double 4 Kw heaters as HITREA SIDEA or Equal | NO | 4 | | |
| E | 20 mm diameter flexible tubing about 300mm long including brass brackets and clips | NO | 8 | | |
| F | 20mm angle valves | NO | 26 | | |
| G | 1200mm fire blanket | NO | 3 | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|----------------------|------|-----|------------|-------------|
| <u>PLUMBING</u> | | | | | |
| <u>COLD AND HOT WATER DISTRIBUTION</u> | | | | | |
| Supply and install INDO GREEN PPR pipe to DIN 8077,8078 manufactured as per DIN 16962 and conforming to ISO and EN 15874 standard. All pipe and fitting to conform to PN25 | | | | | |
| A | 40mm diameter pipe | Lm | 68 | | |
| B | 32 mm diameter pipe | Lm | 76 | | |
| C | 25 mm diameter ditto | Lm | 86 | | |
| D | 20 mm diameter ditto | Lm | 60 | | |
| <u>Extra Over Tubbing For:-</u> | | | | | |
| <u>BEND /ELBOWS</u> | | | | | |
| E | 32mm diameter | NO | 18 | | |
| F | 25mm diameter | NO | 24 | | |
| G | 20mm diameter | NO | 16 | | |
| <u>Equal Tee</u> | | | | | |
| H | 40mm diameter | NO | 48 | | |
| I | 32mm diameter | NO | 30 | | |
| J | 25mm diameter | NO | 40 | | |
| K | 20mm diameter | NO | 26 | | |
| <u>REDUCERS</u> | | | | | |
| L | 40 x 32mm diameter | NO | 22 | | |
| M | 32 x 25mm diameter | NO | 22 | | |
| N | 32 x 20mm diameter | NO | 24 | | |
| O | 25 x 20mm diameter | NO | 30 | | |
| TOTAL CARRIED TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|---|------|-----|------------|-------------|
| TOTAL BROUGHT FORWARD | | | | | |
| GATE VALVES | | | | | |
| A | 25mm diameter gate valve as peglar | NO | 8 | | |
| B | 32mm diameter | NO | 8 | | |
| C | 20mm ditto | NO | 8 | | |
| Male PPR Adaptors | | | | | |
| D | 25mm x 20mm diameter | NO | 26 | | |
| E | 32mm x20mm diameter | NO | 28 | | |
| F | 32mm x25mm diameter | NO | 22 | | |
| G | Peglar 25mm diameter Shower valves | NO | 8 | | |
| H | 20mm diameter Shower rose and arm | NO | 8 | | |
| PPR Male Screwed Bend | | | | | |
| I | 32 x 25mm Dia | NO | 12 | | |
| J | 25mm x 20mm Dia | NO | 12 | | |
| PPR Female Adaptor | | | | | |
| K | 25mm x 20mm diameter | NO | 12 | | |
| L | 32mm x20mm diameter | NO | 12 | | |
| M | 32mm x25mm diameter | NO | 20 | | |
| <u>ROOF WATER STORAGE TANKS</u> | | | | | |
| N | Rotary moulded water tank as ROTO with size 1080 dia x 1120mm high and capacity of 1500 Litres. The tank to have:- 1. 20mm diameter inlet connection 2. 2 No. 25 mm outlet connections. 3. 25 mm overflow to the rain water gutter 4. 40 mm wash out to the rain water gutter with a gate valve. 5. Cover lid. 6. 25mm diameter high pressure float valve | NO | 4 | | |
| BOOSTER PUMPS | | | | | |
| O | Submersible Booster pumps as Pedrollo NKm 2/5 complete with control panels, 100 litres pressure cylinder and switch, 40m control cable, pressure switch and any other accessories | SETS | 2 | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|----------|---|------|-----|------------|-------------|
| | DRAINAGE - | | | | |
| | Fix uPVC soil system to BS 4660 and BS 4515 and MuPVC waste system to BS 5255 with screwed and socketed joints to BS 21, solvent welded joints shall be as per the manufacture's written instructions. Tenders must allow in their pipework prices for all the running lengths of pipework and also where necessary for pipe fixing clips, holderbats, plugs and screwed. The installation must comply with BS 5572. All pipework to be as KEY TERRAIN. | | | | |
| | MuPVC waste system conforming to BS 5255 | | | | |
| A | 200.125.40 high temperature waste pipe /32mm | 40 | LM | | |
| B | 200.15.40 ditto /40mm | 40 | LM | | |
| C | 200.3.40 ditto/50mm | 80 | LM | | |
| D | 100.4.40/100mm waste pipe | 98 | LM | | |
| E | 100.4.40/150mm waste pipe | 60 | LM | | |
| | Extra over MuPVC waste pipework for the following:- | | | | |
| F | 32mm sweep access bend | 28 | No. | | |
| G | Ditto but 40mm | 20 | No. | | |
| H | E+A303:A321 | 26 | No. | | |
| I | Ditto but 75mm | 12 | No. | | |
| J | Ditto but 100mm | 28 | No. | | |
| K | 204.15.91 sweep tee | 14 | No. | | |
| L | 204.2.135 tee | 16 | No. | | |
| M | 237.15 Access plug | 16 | No. | | |
| N | 237.2 Access plug | 16 | No. | | |
| O | 279.2 floor traps complete with covers | 24 | No. | | |
| P | 282.6 floor traps inlet | 24 | No. | | |
| | TOTAL CARRIED TO NEXT PAGE | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--------------------------------------|---|------|-----|------------|-------------|
| | TOTAL BROUGHT FORWARD | | | | |
| | Extra over soil pipe for the following:- | | | | |
| A | 129.4.90 WC connector bend | 18 | No. | | |
| B | 100X50mm boss connector | 22 | No. | | |
| C | 100x40mm ditto | 8 | No. | | |
| D | 100x32mm ditto | 8 | No. | | |
| E | 75X50mm ditto | 8 | No. | | |
| F | 100mm diameter single branch | 4 | No. | | |
| G | 149.14.22 weathering slate | 6 | No. | | |
| H | 150.4 vent cowl | 6 | No. | | |
| I | Gulley trap complete with grating | 8 | No. | | |
| J | 600x450 Manhole complete with reinforced concrete covers and frames | 16 | No. | | |
| K | Excavate trench for 100/150 mm pipe including pipe bed average 600 mm deep and 450 mm wide. | 200 | Lm. | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

SOLAR WATER HEATING INSTALLATIONS

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|----------|---|------|------|------------|-------------|
| A | <p>Supply, delivery to site, installation and commissioning of pre heat solar Hot Water System in accordance with conditions of contract and with specifications of the following</p> <p>SOLAR HOT WATER STORAGE CYLINDER</p> <p>The storage Cylinder shall be fabricated from 3mm thick stainless steel plate suitable for Horizontal mounting and the insulation shall be polyurethane foam 50mm thick injected in the void between outer wall of the storage tank and the outer casings. The outer casing shall be mild steel sheet 24gauge Solar Hot Water Storage Cylinder capacity and connections shall be as follows:-</p> <p>Solar Hot Water Storage Cylinder capacity and connections shall be as follows:-</p> <p>Capacity: 300litres Internal dimensions: Dia 600 x 2050 mm long</p> | No | 2 | | |
| B | <p>The Connections shall be done using the following:</p> <p>25mm diameter water supply 32mm diameter hot water supply 25mm diameter water supply to solar panels 25mm diameter hot water return from panels 15mm diameter drain 15 mm diameter Automatic Air Release Valve 2 No Boss for heating element</p> | Item | Item | | |
| C | <p>Supporting Framework.</p> <p>Allow Supports for the above Solar hot water Cylinder to Engineer' approval</p> | No | 2 | | |

TOTAL CARRIED TO NEXT PAGE

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|----------------------------|---|------|------|------------|-------------|
| | TOTAL BROUGHT FORWARD | | | | |
| A | SOLAR PANELS Solar panels shall be as “MEGASUN 200 E” or Copper Sheet Solar Panels manufactured by HELIOAKMI or equal and approved with heat exchanger of copper tubes, polyurethane foam cast under and around the absorber plate or 250mm pressed fiber glass insulation, 0.7mm copper sheet absorber plate with “selective surface’ coating and all the necessary interconnectors, dielectric unions, washout valves, etc with 4.2 m2 net absorbing area for the two Panels. | No | 4 | | |
| B | Supporting framework Allow supports 40 x 40 x 6mm mild steel angle iron fixed on roof for the above Solar Panels heating units to engineer’s approval. | Item | Item | | |
| C | Electrical Heating Booster Elements 3kW 240V 50Hz heating element complete with thermostat mounted in the Hot Water cylinder for ripple power supply. | No | 2 | | |
| D | Wiring Allow for all wiring to immersion heat from consumer unit through DP Switches. | Item | Item | | |
| E | Brass Couplings 22mm diameter machined brass coupling for interconnecting solar panels. | No | 8 | | |
| F | Brass Plugs 22mm diameter machined brass plugs. | No | 8 | | |
| G | Pipe connectors 22mm diameter machined brass pipe connectors. | No | 8 | | |
| TOTAL CARRIED TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|-------------------------------|---|------|------|------------|-------------|
| | TOTAL BROUGHT FORWARD | | | | |
| | Pipe Insulation | | | | |
| | All pipework listed below shall be insulated with 25mm thick industrial grade “Amoflex” insulation. All insulating for bends etc as necessary in your pipework prices. Note that some pipework will be installed by others and it will be your responsibility to insulate them.(if separated) | | | | |
| A | 32 diameter PPR Pipewrk Insulation | Lm | 20 | | |
| B | Pressure and circulation pump | | | | |
| | Supply and Install 1.5 bar circulation pump as DAYLIFF DDP50A or equivalent suitable and recommended for the specified solar water heating system | No | 2 | | |
| C | Allow for any other material necessary for successful completion of the work: - Specify | Item | Item | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

SUMMARY PAGE FOR MAIN HOUSE

| | DESCRIPTION | |
|-------------------------------------|--------------------------|--|
| 1 | MAIN HOUSE SANITARY WARE | |
| 2 | PLUMBING SERVICES | |
| 3 | DRAINAGE SERVICES | |
| 4 | SOLAR WATER HEATING | |
| TOTALS CARRIED TO MAIN SUMMARY PAGE | | |

2 No. GAZEBOs

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|---|------|-----|------------|-------------|
| <u>SANITARY FITTINGS</u> | | | | | |
| <u>SUPPLY, DELIVER AND FIX THE FOLLOWING BATH ROOM SUIT FROM ROCA/GROHE/DURAVIT/HANGSROHE PRODUCTS.</u> | | | | | |
| WC SUITES | | | | | |
| A | 'DURAVIT" Back-To-Wall W.C pan with horizontal outlet in Vitreous China to B.S 3402 comprising of WC pan , seat & cover with soft closing stainless steel hinges, Close coupled Cistern with dual flush fittings . Fixing Kit, cistern fittings, connector, chrome plated dome screws, volume regulator and mounting brackets. | NO. | 2 | | |
| B | WC as Duravit D-Code for the disabled complete with seat and cover WC connector and all fixing accessories 4NO.540mm Grab rails as Mediclinics BR0400, 1No. Wall grab bar left/right as Mediclinics BFI600, 1No. Hinge down support rail complete with toilet roll holder as Mediclinics BG0800, 450mm door pull rail, and all necessary accessories. | NO | 1 | | |
| WHB | | | | | |
| C | 'DURAVIT" Countertop wash hand basin 600 x 450 mm with one tap hole, in Vitreous China, 1 1/4" pop up waste, Chain, waste, flexible tube, chrome plated bottle trap and metal handle S8910 and servicing valves | NO | 2 | | |
| TOTAL CARRIED FORWARD TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|--|------|-----|------------|-------------|
| TOTAL BROUGHT FORWARD | | | | | |
| <u>SANITARY FITTINGS: ACCESSORIES</u> | | | | | |
| <u>BASIN MIXERS</u> | | | | | |
| A | Roca " LOGICA 5272321JO" Monoblock basin mixer with flow limiter, pop-up waste and flexible supply hoses. | NO | 2 | | |
| <u>SANITARY FITTINGS: ACCESSORIES</u> | | | | | |
| <u>TOILET ROLL HOLDERS</u> | | | | | |
| B | ROCA "serie FASHION " Toilet roll holder No 81600900Y size 150 x 150 mm | NO | 3 | | |
| <u>ACCESSORIES</u> | | | | | |
| C | 0.8Litre capacity Automatic Soap dispenser as Mediclinics DJ0160AS chrome finish | No | 2 | | |
| D | 1.64 kw Automatic hand drier as Mediclinics optima M99A 220-240V: ABS cover white finish: to include power connection (in concealed conduit) to a local electrical isolator. | No | 2 | | |
| E | Wall mounted brush holder as ROCA Superinox | No. | 2 | | |
| <u>WALL MIRRORS</u> | | | | | |
| F | Bevelled edge polished Rectangular glass mirror size 900 x 600 x 6mm thick Ref No. 812183000 with silver backing with chromium plated dome shaped nuts and brass screws plugged. | NO | 1 | | |
| TOTAL CARRIED FORWARD TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|-------------------------------|--|------|-----|------------|-------------|
| TOTAL BROUGHT FORWARD | | | | | |
| <u>Kitchen sinks</u> | | | | | |
| A | Stainless steel inset sinks, double bowl double drain sink 1500 X | | | | |
| | 550mm with two tap holes No. 876471165. Complete with | | | | |
| | monoblock sink mixer,high swivel spout aerator Ref AMURA | | | | |
| | 526172370 ,flexible supply hoses and unslotted pop up chrome waste | NO | 2 | | |
| | plate | | | | |
| B | 10 litres 4 Kw under sink instantanous water heater as ARISTON | NO | 1 | | |
| | or Equal | | | | |
| C | 40 Gallons HWC with double 4 Kw heaters as HITREA SIDEA | NO | 4 | | |
| | or Equal | | | | |
| D | 20 mm diameter flexible tubing about 300mm long | NO | 8 | | |
| | including brass brackets and clips | | | | |
| E | 20mm angle valves | NO | 8 | | |
| F | 1200mm fire blanket | NO | 2 | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|----------------------|------|-----|------------|-------------|
| <u>PLUMBING</u> | | | | | |
| <u>COLD AND HOT WATER DISTRIBUTION</u> | | | | | |
| Supply and install INDO GREEN PPR pipe to DIN 8077,8078 manufactured as per DIN 16962 and conforming to ISO and EN 15874 standard. All pipe and fitting to conform to PN25 | | | | | |
| A | 40mm diameter pipe | Lm | 68 | | |
| B | 32 mm diameter pipe | Lm | 76 | | |
| C | 25 mm diameter ditto | Lm | 86 | | |
| D | 20 mm diameter ditto | Lm | 60 | | |
| <u>Extra Over Tubbing For:-</u> | | | | | |
| <u>BEND /ELBOWS</u> | | | | | |
| E | 32mm diameter | NO | 18 | | |
| F | 25mm diameter | NO | 24 | | |
| G | 20mm diameter | NO | 16 | | |
| <u>Equal Tee</u> | | | | | |
| H | 40mm diameter | NO | 48 | | |
| I | 32mm diameter | NO | 30 | | |
| J | 25mm diameter | NO | 40 | | |
| K | 20mm diameter | NO | 26 | | |
| <u>REDUCERS</u> | | | | | |
| L | 40 x 32mm diameter | NO | 22 | | |
| M | 32 x 25mm diameter | NO | 22 | | |
| N | 32 x 20mm diameter | NO | 24 | | |
| O | 25 x 20mm diameter | NO | 30 | | |
| TOTAL CARRIED TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|---|------|-----|------------|-------------|
| TOTAL BROUGHT FORWARD | | | | | |
| GATE VALVES | | | | | |
| A | 25mm diameter gate valve as peglar | NO | 8 | | |
| B | 32mm diameter | NO | 8 | | |
| C | 20mm ditto | NO | 8 | | |
| Male PPR Adaptors | | | | | |
| D | 25mm x 20mm diameter | NO | 26 | | |
| E | 32mm x20mm diameter | NO | 28 | | |
| F | 32mm x25mm diameter | NO | 22 | | |
| G | Peglar 25mm diameter Shower valves | NO | 8 | | |
| H | 20mm diameter Shower rose and arm | NO | 8 | | |
| PPR Male Screwed Bend | | | | | |
| I | 32 x 25mm Dia | NO | 12 | | |
| J | 25mm x 20mm Dia | NO | 12 | | |
| PPR Female Adaptor | | | | | |
| K | 25mm x 20mm diameter | NO | 12 | | |
| L | 32mm x20mm diameter | NO | 12 | | |
| M | 32mm x25mm diameter | NO | 20 | | |
| <u>ROOF WATER STORAGE TANKS</u> | | | | | |
| N | Rotary moulded water tank as ROTO with size 1080 dia x 1120mm high and capacity of 1500 Litres. The tank to have:- 1. 20mm diameter inlet connection 2. 2 No. 25 mm outlet connections. 3. 25 mm overflow to the rain water gutter 4. 40 mm wash out to the rain water gutter with a gate valve. 5. Cover lid. 6. 25mm diameter high pressure float valve | NO | 4 | | |
| BOOSTER PUMPS | | | | | |
| O | Submersible Booster pumps as Pedrollo NKm 2/5 complete with control panels, 100 litres pressure cylinder and switch, 40m control cable, pressure switch and any other accessories | SETS | 2 | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|----------|---|------|-----|------------|-------------|
| | DRAINAGE - | | | | |
| | Fix uPVC soil system to BS 4660 and BS 4515 and MuPVC waste system to BS 5255 with screwed and socketed joints to BS 21, solvent welded joints shall be as per the manufacture's written instructions. Tenders must allow in their pipework prices for all the running lengths of pipework and also where necessary for pipe fixing clips, holderbats, plugs and screwed. The installation must comply with BS 5572. All pipework to be as KEY TERRAIN. | | | | |
| | MuPVC waste system conforming to BS 5255 | | | | |
| A | 200.125.40 high temperature waste pipe /32mm | 40 | LM | | |
| B | 200.15.40 ditto /40mm | 40 | LM | | |
| C | 200.3.40 ditto/50mm | 80 | LM | | |
| D | 100.4.40/100mm waste pipe | 98 | LM | | |
| E | 100.4.40/150mm waste pipe | 60 | LM | | |
| | Extra over MuPVC waste pipework for the following:- | | | | |
| F | 32mm sweep access bend | 28 | No. | | |
| G | E+A715:A733 | 20 | No. | | |
| H | Ditto but 50mm | 26 | No. | | |
| I | Ditto but 75mm | 12 | No. | | |
| J | Ditto but 100mm | 28 | No. | | |
| K | 204.15.91 sweep tee | 14 | No. | | |
| L | 204.2.135 tee | 16 | No. | | |
| M | 237.15 Access plug | 16 | No. | | |
| N | 237.2 Access plug | 16 | No. | | |
| O | 279.2 floor traps complete with covers | 24 | No. | | |
| P | 282.6 floor traps inlet | 24 | No. | | |
| | TOTAL CARRIED TO NEXT PAGE | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--------------------------------------|---|------|-----|------------|-------------|
| | TOTAL BROUGHT FORWARD | | | | |
| | Extra over soil pipe for the following:- | | | | |
| A | 129.4.90 WC connector bend | 18 | No. | | |
| B | 100X50mm boss connector | 22 | No. | | |
| C | 100x40mm ditto | 8 | No. | | |
| D | 100x32mm ditto | 8 | No. | | |
| E | 75X50mm ditto | 8 | No. | | |
| F | 100mm diameter single branch | 4 | No. | | |
| G | 149.14.22 weathering slate | 6 | No. | | |
| H | 150.4 vent cowl | 6 | No. | | |
| I | Gulley trap complete with grating | 8 | No. | | |
| J | 600x450 Manhole complete with reinforced concrete covers and frames | 16 | No. | | |
| K | Excavate trench for 100/150 mm pipe including pipe bed average 600 mm deep and 450 mm wide. | 200 | Lm. | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

SUMMARY PAGE FOR 2 NO. GAZEBOs

| | DESCRIPTION | |
|-------------------------------------|-------------------|--|
| 1 | SANITARY WARE | |
| 2 | PLUMBING SERVICES | |
| 3 | DRAINAGE SERVICES | |
| TOTALS CARRIED TO MAIN SUMMARY PAGE | | |

GATE HOUSES & STAFF QUARTERS

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|----------------------------|---|------|-----|------------|-------------|
| | <u>To supply and install the following sanitary fittings including all necessary joints to service overflow and waste pipes, jointings and motices, plugs, screws, bolts, and making good sanitary fittings will be to Architect's /Engineer approval of the relevant samples</u> | | | | |
| A | E7172 Space Armitage Shanks close coupled wash down W.C pan with horizontal outlet in Vitreous China to B.S 3402 comprising of WC pan, E7184 space push button dual cistern, 6.0litres bottom supply and internal over flow, E7091 apace seat & cover with stainless steel hinges. | NO | 6 | | |
| B | Orbit Armitage shanks (S2552)) self riming counter top wash hand basin with one tap hole, in Vitreous China, 1/2' 1/2' S7310 cobra mixer tap with non return valve and 1 1/4" pop up waste, Chain, waste, flexible tube, chrome plated bottle trap and metal handle S8910 and is valve servicing valves | NO | 4 | | |
| C | Pedestal Wash hand basin: Armitage shanks wash hand basin with one tap hole, chrome plated basin mixer as Cobra; invitreous china complete with 15mm monobloc mixer pop up waste fitting, 32mm bottle trap with 75mm seal pedestal stand and mounting brackets plus | No. | 2 | | |
| D | "Armitage Shanks" full recessed Toilet roll holder No S5004 size 150 x 150 mm | NO | 6 | | |
| E | "Armitage Shanks" full recessed soap dish No S5010 size 150 x 150 mm | NO | 2 | | |
| F | Chrome plated coat hook | NO | 6 | | |
| G | Shower fittings Concealed shower complete with concealed shower stop corks, shower arm, swivel/ adjustable shower rose, chrome plated bib tap and other necessary fittings. All to be as Cobra or equal and approved. | No. | 4 | | |
| TOTAL CARRIED TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|----------------------------------|---|------|-----|------------|-------------|
| TOTAL BROUGHT FORWARD | | | | | |
| A | Wall mounted glass soap gel dispenser; manually operated | No. | 4 | | |
| B | Plain polished edge mirror size 600x550 fixed on the wall with chrome plated form sheated screws, polyutherine backing and dome screws | NO | 2 | | |
| C | Plain polished edge mirror size 1800x600 fixed on the wall with chrome plated form sheated screws, polyutherine backing | NO | 3 | | |
| D | Angle valve for washbasin and WC | NO | 12 | | |
| E | Stainless steel inset sinks, double bowl double drain sink 1500 X 550mm with two tap holes No. 876471165. Complete with monoblock sink mixer,high swivel spout aerator,flexible supply hoses and unslotted pop up chrome waste plate as Armitage Shanks | NO | 2 | | |
| F | <u>H.W.C</u> 30 gallons hot water cylinder 2.5mm thick to BS 417 manufactured and insulated with 50mm thick fibre glass with 3KW and 1.5KW heater element thermostatically controlled as aqua heat. | NO | 4 | | |
| G | 7 litres 4 KW under sink instantaneous water heater | NO | 1 | | |
| H | 1200mm fire blanket | NO | 1 | | |
| TOTAL CARRIED TO COLLECTION PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|----------------------|------|-----|------------|-------------|
| <u>PLUMBING</u> | | | | | |
| <u>COLD AND HOT WATER DISTRIBUTION</u> | | | | | |
| Supply and install INDO GREEN PPR pipe to DIN 8077,8078 manufactured as per DIN 16962 and conforming to ISO and EN 15874 standard. All pipe and fitting to conform to PN25 | | | | | |
| A | 40mm diameter pipe | Lm | 68 | | |
| B | 32 mm diameter pipe | Lm | 76 | | |
| C | 25 mm diameter ditto | Lm | 86 | | |
| D | 20 mm diameter ditto | Lm | 60 | | |
| <u>Extra Over Tubbing For:-</u> | | | | | |
| <u>BEND /ELBOWS</u> | | | | | |
| E | 32mm diameter | NO | 18 | | |
| F | 25mm diameter | NO | 24 | | |
| G | 20mm diameter | NO | 16 | | |
| <u>Equal Tee</u> | | | | | |
| H | 40mm diameter | NO | 48 | | |
| I | 32mm diameter | NO | 30 | | |
| J | 25mm diameter | NO | 40 | | |
| K | 20mm diameter | NO | 26 | | |
| <u>REDUCERS</u> | | | | | |
| L | 40 x 32mm diameter | NO | 22 | | |
| M | 32 x 25mm diameter | NO | 22 | | |
| N | 32 x 20mm diameter | NO | 24 | | |
| O | 25 x 20mm diameter | NO | 30 | | |
| TOTAL CARRIED TO NEXT PAGE | | | | | |

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--|---|------|-----|------------|-------------|
| TOTAL BROUGHT FORWARD | | | | | |
| GATE VALVES | | | | | |
| A | 25mm diameter gate valve as peglar | NO | 8 | | |
| B | 32mm diameter | NO | 8 | | |
| C | 20mm ditto | NO | 8 | | |
| <u>Male PPR Adaptors</u> | | | | | |
| D | 25mm x 20mm diameter | NO | 26 | | |
| E | 32mm x20mm diameter | NO | 28 | | |
| F | 32mm x25mm diameter | NO | 22 | | |
| G | Peglar 25mm diameter Shower valves | NO | 8 | | |
| H | 20mm diameter Shower rose and arm | NO | 8 | | |
| <u>PPR Male Screwed Bend</u> | | | | | |
| I | 32 x 25mm Dia | NO | 12 | | |
| J | 25mm x 20mm Dia | NO | 12 | | |
| <u>PPR Female Adaptor</u> | | | | | |
| K | 25mm x 20mm diameter | NO | 12 | | |
| L | 32mm x20mm diameter | NO | 12 | | |
| M | 32mm x25mm diameter | NO | 20 | | |
| <u>ROOF WATER STORAGE TANKS</u> | | | | | |
| N | Rotary moulded water tank as ROTO with size 1080 dia x 1120mm high and capacity of 1500 Litres. The tank to have:- 1. 20mm diameter inlet connection 2. 2 No. 25 mm outlet connections. 3. 25 mm overflow to the rain water gutter 4. 40 mm wash out to the rain water gutter with a gate valve. 5. Cover lid. 6. 25mm diameter high pressure float valve | NO | 4 | | |
| <u>BOOSTER PUMPS</u> | | | | | |
| O | Submersible Booster pumps as Pedrollo NKm 2/5 complete with control panels, 100 litres pressure cylinder and switch, 40m control cable, pressure switch and any other accessories | SETS | 2 | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

| ITEM NO. | DESCRIPTION | QTY | UNIT | RATE KSHS. | TOTAL KSHS. |
|----------|---|-----|------|------------|-------------|
| | DRAINAGE - | | | | |
| | Fix uPVC soil system to BS 4660 and BS 4515 and MuPVC waste system to BS 5255 with screwed and socketed joints to BS 21, solvent welded joints shall be as per the manufacture's written instructions. Tenders must allow in their pipework prices for all the running lengths of pipework and also where necessary for pipe fixing clips, holderbats, plugs and screwed. The installation must comply with BS 5572. All pipework to be as KEY TERRAIN. | | | | |
| | MuPVC waste system conforming to BS 5255 | | | | |
| A | 200.125.40 high temperature waste pipe /32mm | 40 | LM | | |
| B | 200.15.40 ditto /40mm | 40 | LM | | |
| C | 200.3.40 ditto/50mm | 80 | LM | | |
| D | 100.4.40/100mm waste pipe | 98 | LM | | |
| E | 100.4.40/150mm waste pipe | 60 | LM | | |
| | Extra over MuPVC waste pipework for the following:- | | | | |
| F | 32mm sweep access bend | 28 | No. | | |
| G | Ditto but 40mm | 20 | No. | | |
| H | E+A994:A1012 | 26 | No. | | |
| I | Ditto but 75mm | 12 | No. | | |
| J | Ditto but 100mm | 28 | No. | | |
| K | 204.15.91 sweep tee | 14 | No. | | |
| L | 204.2.135 tee | 16 | No. | | |
| M | 237.15 Access plug | 16 | No. | | |
| N | 237.2 Access plug | 16 | No. | | |
| O | 279.2 floor traps complete with covers | 24 | No. | | |
| P | 282.6 floor traps inlet | 24 | No. | | |
| | TOTAL CARRIED TO NEXT PAGE | | | | |

| ITEM No | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|--------------------------------------|---|------|-----|------------|-------------|
| | TOTAL BROUGHT FORWARD | | | | |
| | Extra over soil pipe for the following:- | | | | |
| A | 129.4.90 WC connector bend | 18 | No. | | |
| B | 100X50mm boss connector | 22 | No. | | |
| C | 100x40mm ditto | 8 | No. | | |
| D | 100x32mm ditto | 8 | No. | | |
| E | 75X50mm ditto | 8 | No. | | |
| F | 100mm diameter single branch | 4 | No. | | |
| G | 149.14.22 weathering slate | 6 | No. | | |
| H | 150.4 vent cowl | 6 | No. | | |
| I | Gulley trap complete with grating | 8 | No. | | |
| J | 600x450 Manhole complete with reinforced concrete covers and frames | 16 | No. | | |
| K | Excavate trench for 100/150 mm pipe including pipe bed average 600 mm deep and 450 mm wide. | 200 | Lm. | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

SUMMARY PAGE FOR GUEST WING AND STAFF QUARTERS

| | DESCRIPTION | AMOUNT KSHS. |
|-------------------------------------|-------------------|-----------------|
| 1 | SANITARY WARE | |
| 2 | PLUMBING SERVICES | |
| 3 | DRAINAGE SERVICES | |
| TOTALS CARRIED TO MAIN SUMMARY PAGE | | |

KITCHEN EXTRACTION

MAIN HOUSE AND GAZEBOs

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|-------------------------------|--|------|-----|------------|-------------|
| A | <u>KITCHEN HOOD</u> Supply and installation of Re-circulation Hood complete with Carbon Filters with all the necessary accessories as per dimensions and engineer's details. Allow for Electrical connections from local isolators to fans and controls. | No. | 4 | | |
| B | <u>KITCHEN EXTRACT FAN</u> 0.025 kW Supply fan as S & P HCM - 150N, Q = 400 m ³ /h; 1900 RPM Single phase; complete with: INT / ATEX ATEX stop-run; wall mounted; CABLE BOX, C2V adaptors and and all other necessary accessories including vibration absorber. | No | 1 | | |
| C | Allow for GI duct to the outside environment | SM | 10 | | |
| D | Allow for support brackets, hangers and angle bars for proper anchoring of the installations | Item | 1 | | |
| E | Allow for termination piece duct complete with end wire mesh | Item | 1 | | |
| F | Allow for weather proofing using fire rated sealant the point at which the duct penetrates the wall with proper flushing | Item | 1 | | |
| G | Allow for electrical works associated with installations of both fans above | Item | 1 | | |
| H | Allow for testing and commissioning of the entire installation | Item | 1 | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

RAINWATER DRAINAGE - NORMAL AND ATTIC UNITS

| ITEM NO. | DESCRIPTION | UNIT | QTY | RATE KSHS. | TOTAL KSHS. |
|-------------------------------|--|------|-----|------------|-------------|
| | <p><u>RAIN WATER DRAINAGE</u></p> <p>PIPEWORK AND FITTINGS</p> <p>Prices for pipe work shall include the cost for couplings, connectors, reducers and joining to fittings and fixing brackets all as required in the pipework installation together with providing and fixing pipe sleeves in structural work.</p> <p>NOTES FOR uPVC PIPE WORK.</p> <p>All u.P.V.C couplings, branches, tees, etc. are to be formed strictly in accordance with the manufacturer's instructions.</p> <p>u.P.V.C Rain Water Drainage Pipes and Fittings for above ground and Buried Pipes To B.S. 4660 and ISO Class 41, Grey in Colour with Rubber joints</p> | | | | |
| A | 100 mm Diameter Pipe | LM | 190 | | |
| | <p>uPVC PIPE WORK FITTINGS</p> <p>BENDS</p> | | | | |
| B | 100mm access Bends | No. | 48 | | |
| | <p>TEES</p> | | | | |
| C | 100 mm diameter Y tee | No. | 38 | | |
| D | 100 mm Fulbora outlet with grating cover. | No. | 18 | | |
| E | 100 mm boss connector | No | 26 | | |
| F | 100 diameter discharge shoe | NO | 18 | | |
| TOTAL CARRIED TO SUMMARY PAGE | | | | | |

GRAND SUMMARY PAGE FOR MECHANICAL INSTALLATIONS

| | DESCRIPTION | AMOUNT KSHS. |
|---|---|-----------------|
| | TOTAL BROUGHT FORWARD FROM | |
| 1 | PRELIMINARIES AND GENERAL CONDITIONS | |
| 2 | MAIN HOUSE SANITARY FITTINGS, PLUMBING AND DRAINAGE | |
| 3 | GAZEBOs - SANITARY FITTINGS, PLUMBING & DRAINAGE (2 No.) | |
| 4 | GATE HOUSE & STAFF QUARTERS SANITARY FITTINGS, PLUMBING AND DRAINAGE | |
| 5 | KITCHEN VENTILATION SYSTEM | |
| 6 | RAINWATER DRAINAGE SYSTEM | |
| 7 | PC SUM FOR SWIMMING POOL | 1,800,000.00 |
| 6 | PC SUM FOR WATER FEATURE & FOUNTAINS | 600,000.00 |
| 7 | PC SUM FOR STEAM & SAUNA EQUIPMENT | 900,000.00 |
| | SUB TOTAL | |
| | 16 % VAT | |
| | TOTAL CARRIED TO FORM OF TENDER | |

Total in words:

Completion Period:

Name of Contractor:

Address:

Telephone:.....

Signature:

Official Stamp/Date: Page 32 of 32