

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 AIR CONDITIONING 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 specification 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 tenderer in the preparation of his 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 new or existing buildings, as the case may be, 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 AIR CONDITIONING AND MECHANICAL VENTILATION WORKS FOR THE PROPOSED RESIDENTIAL HOUSE FOR THE SPEAKER OF THE COUNTY ASSEMBLY OF KILIFI ON PLOT NO 328CHEMBE/ KIBABA, KILIFI COUNTY”**

The tender must be received as stated in the invitation letter

Tenders received later than the date specified above 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: PROPOSED RESIDENTIAL HOUSE FOR THE SPEAKER OF THE COUNTY ASSEMBLY OF KILIFI ON PLOT NO 328CHEMBE/ 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 **Air Conditioning and Mechanical Ventilation 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 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 (CLIENT) of \_\_\_\_\_

in the sum of Kenya Shillings. \_\_\_\_\_

\_\_\_\_\_ (Kshs. \_\_\_\_\_)

to be paid by us to the said \_\_\_\_\_ (CLIENT)

WHEREAS by an agreement in writing dated \_\_\_\_\_

(CONTRACTOR) of \_\_\_\_\_

Contracted with the said \_\_\_\_\_ (CLIENT)

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 \_\_\_\_\_ (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 (wilful or otherwise) of the said agreement committed with or without the knowledge or consent of the said \_\_\_\_\_ (CONTRACTOR)

by or on behalf of with the knowledge or consent of the said

\_\_\_\_\_ (CLIENT)

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

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

### **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.

#### 1. **Site:**

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

#### 2. **Contract**

The successful tenderer will be appointed as a Contractor under the latest edition of the Agreement and Association of Buildings 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 Contractor who is to examine these sections of the Bills and allow for all costs incurred.

## PARTICULAR SPECIFICATION FOR AIR CONDITIONING

### 1.0 SCOPE OF THE SUB-CONTRACT

The contractor shall make himself familiar with the site conditions that affect these works and all plant, equipment, apparatus, materials and installations shall be suitable for these conditions.

Where not otherwise stated, all ratings of plant, equipment and apparatus shall be interpreted as site ratings and not any others.

The contract works consist of the supply, delivery, erection, testing, commissioning and setting to work of the Air Conditioning System and mechanical ventilation works detailed in the specification and accompanying contract drawings. The sub-contractor shall include for all appurtenances and appliances not particularly called for in this specification or shown on the contract drawings but which are necessary for the completion and satisfactory functioning of the sub-contract works. No claims for extra payments shall be accepted from the contractor due to his failure to adhere to the above requirements.

It is deemed that if in the opinion of the tenderer at the time of tendering there exists a difference between the specification and the contract drawings, that the tenderer has clarified these with the project manager/engineer before tendering.

### 1.1 GENERAL

#### 1.1.1 Location of Site

This site of the sub-contract works shall be situated **ON PLOT NO 328 CHEMBE/ KIBABA, KILIFI COUNTY**

The following climatic conditions apply at the various sites and all the materials and equipment used shall be suitable for these conditions:

<b>CLIMATIC CONDITIONS</b>	<b>KILIFI TOWN</b>
Maximum Design Temperature	32°C
Minimum Temperature	10°C
Relative Humidity	90%
Altitude	0M ASL
Longitude	42° 39' E
Latitude	02° 03' S

Extremely heavy rains fall at certain periods of the year and the tenderer shall be deemed to have taken account of this fact in his prices and in the planning of the execution of sub-contract works.

#### 1.1.2 System Design Data

The air-conditioning systems are designed to maintain the following internal conditions with ambient conditions of 28°C DB and 55% RH

Internal Temperature	22 ± 2°C
Relative Humidity	50± 10%

## **1.2 AIR CONDITIONING SYSTEM**

The equipment described here under covers the specific requirements of equipment to be used for this sub-contract work and shall be used in conjunction with the accompanying contract drawings.

It shall be deemed that the tenderer has based his tender on plant and equipment which is equal in performance to that stated within the specification.

### **1.2.1 Inverter Controlled Outdoor Unit**

The air conditioning unit shall allow for 16 indoor units of different capacity & types to be connected to a single refrigerant piping system. It shall have an outdoor unit capacity ratio of 50-130% with nominal cooling load as stated in the bill of quantities and capacity control in the range of 10 - 130% according to the indoor cooling load.

The Unit shall be complete with the following:

- Casing constructed of 18 gauge zinc coated mild steel, zinc phosphate bonderized, coated with oven baked polyester paint and weatherized for outdoor installation. It shall have weep holes on base to allow ease of drainage. It shall have permanently attached base rails with 3-way forklift access and lifting holes.
- 3 No. Hermetically sealed compressors mounted to unit base with rubber isolated hold down bolts, uniform in oil & pressures and shall have internal overload protection.
- Direct expansion cooling coil with copper tubes and aluminium fins
- Refrigeration pipework with flared connections
- Distributor with refrigeration control
- Refrigerant (R410A) charge
- Fixing brackets/wall mounting kit/ceiling mounting kit
- By-pass valve to control capacities when operating at very small indoor capacity
- Heat exchanger capacity controls
- Precise inverter frequency controls
- New oil returning system (refrigerant oil control system)
- High and low pressure units
- An innovation of installation with automatic address settings for indoor units with twin multiplex transmission system of no polarity.
- Condensate discharge pipe work
- Service access valves
- Voltage Surge Protector



The system shall be suitable for 415V, 3 – Phase, 50Hz power supply.

The unit shall be installed on a plinth provided by others, but the sub-contractor shall mark in advance the exact dimensioned position to the approval of the services engineer. The sub-contractor shall also be responsible for the drainage of condensed water from the drain pan and provision of anti-vibration mountings.

### **1.2.2 Evaporator (Indoor) Units**

Each coil unit shall consist of a cooling coil, air circulating fan, fan-guard and a thermostatic expansion valve. A timer unit shall be mounted in the control panel to both the de-frosting intervals and defrosting periods, both of which shall be variable.

The evaporator unit shall be of capacity as specified under the specified conditions, and shall be of the dry expansion type, and preferably of similar make as that of the condensing units. The unit shall be cassette type, high wall mounted or ceiling mounted as will be specified by the Engineer.

The coil shall be manufactured from seamless copper tubing with aluminium fins mechanically bonded to the tubes.

The panel shall be interlocked such, that on energizing the heater, the compressor, condenser and evaporator fan shall be de-energized and only re-energized when the heater is switched off by a evaporator mounted thermostat. A manual overriding switch shall by-pass the timer switch.

The air-circulating fan shall be manufactured from rigid aluminium sheet and finished in white casing. A drip tray with 25mm diameter connections shall be incorporated in the base of the casing.

The Unit shall be complete with the following:

- 1 No. air purifying filter.
- Built in drain pump to automatically drain water.
- Refrigeration pipework with flared connections
- Fixing brackets/wall mounting kit/ground mounting kit
- Thermostat to control room temperature
- High and low pressure units
- Condensate discharge pipework in Black PVC, 15mm diameter
- Service access valves
- Voltage Surge Protector

The system shall be suitable for 240V, 1 – Phase, 50Hz power supply

The split air-conditioning system shall be designed to maintain room inside temperature of  $24\pm 1^{\circ}\text{C}$  and relative humidity of  $50\pm 10\%$ .

### **1.2.3 Refrigerant Circuit**

Refrigerant piping connections shall be quick connect couplings. The Ozone friendly refrigerant flow shall be controlled with either a capillary tube or thermostatic expansion valve. Pipework shall be approved copper tubing and fittings, and shall be properly sized in conformity with “Trane Refrigeration Manual”.

Good workmanship shall be required to ensure that all the connections are completely at tight. The suction line shall be insulated with at least 25mm thickness or approved insulating material which shall not have insulating properties inferior to those of cork.

### **1.2.4 Air filters**

The air filter shall be washable and reusable of viledon fibre or saran net type.

### **1.2.5 Condensate Drain Pan**

These shall be coated with epoxy powder coating and insulated.

## **1.3 Control Panel**

Each Multi-V system shall be provided for with a purpose made control panel fabricated from mild steel sheet of minimum SWG18 with a hinged door and then powder coated after manufacture. It shall be provided with an integral lock. It shall be complete with;

- ❖ Isolator
- ❖ Contactors
- ❖ Controlling thermostat with temp range from -10<sup>0</sup>C to +30<sup>0</sup>C
- ❖ 80mm dial thermometer with temp range from -10<sup>0</sup>C to +30<sup>0</sup>C
- ❖ Motor starters & current overload relays
- ❖ MCBs
- ❖ Phase failure relay with over and under voltage protection
- ❖ Timer switch for defrost control
- ❖ Push buttons for start and stop
- ❖ Audible and visual high temperature alarm with manual reset

The panel shall also have green light running indicators, red “door open” light and equipment circuit trip lights.

## **1.4 Controls System**

Each VRV system shall incorporate complete controls to ensure continuous system services. Such controls shall include protection against any possible motor overload and over-heat, central control and monitoring for all the indoor units, individual temperature setting for each indoor unit, group control, set lock for each indoor unit and shall have self diagnosis function (display system errors).

The running control shall be by an intelligent central control unit as Deluxe Central Control model ‘PQCSW502A0’ or approved equivalent.

The unit shall have a lock release to allow for control of the system by using wireless or wired remote control at the place where the indoor unit is installed. It shall also have a setup of a weekly and detailed schedule of the individual air conditioner through the Touch Screen/GUI. The unit shall be complete with;

- 8.0” TFT LCD screen.
- Touch screen panel
- Interface devices (CNU and PI485 gateway)
- Independent Battery Built-in (min 2 hours)
- The indoor units shall have wired remote control.
- Inbuilt controls software

The CNU (I-gateway) converts the Ethernet protocol into RS 485 protocol and vice versa. This shall be supplied with the control system.

The PI485 converts the protocol of the air conditioner to the 485 protocol and vice versa. This shall be supplied one per single machine in the outdoor combination unit and shall be with the control system.

### **1.5 Electrical Works**

The tenderer shall include for supply, installation and commissioning of all starters, control apparatus, control panels and interconnecting wiring and conduits for equipment that the tenderer is supplying.

The Electricity will be supplied by others to the isolator within two metres of the location of the equipment. The sub-contractor shall do the wiring of data communication cables of the machine and all indoor units.

The electrical subcontractor shall be responsible for providing power to a local Isolator and connecting power to it. The ventilation subcontractor shall be responsible for the connections between the Isolator and the control panel. The panel shall be approximately three (3) meters from Isolator. The subcontractor shall be responsible for connections between the panel and the fan, fire damper and within the panel. Electrical works under this subcontractor shall include conduit works and a suitable weatherproof Isolator next to the fan.

### **3.6 Testing**

All the pipe work in connection is to be tested in the presence of the Engineer and to the hydraulic pressure the Engineer deems satisfactory and for a minimum period of 1 hour.

These tests must be before any insulation work is undertaken or any pipe work is finally enclosed in any ducts, etc and due allowance is to be made in the tender for these tests.

The tenderer is to include for providing for all the testing equipment, temporary plugging and refilling etc.

### **3.7 Instruction Manuals**

The Sub-contractor is to prepare and hand over to the Engineer on a site written receipt for duplicate copies of full operating and maintenance instruction for all mechanical equipment which he has installed under the Sub-contract.

## **BILLS OF QUANTITIES**

1. The Bills of Quantities form part of the contract documents and are to be read in conjunction with the contract drawings and general specifications of materials and works.
2. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all taxes(including **16% VAT**).

In accordance with Government policy, the 16% VAT **shall be deducted** from all payments made to the tenderer, and the same shall be forwarded to the **Kenya Revenue Authority (KRA)**.

3. All prices omitted from any item, section or part of the Bills of Quantities shall be deemed to have been included to another item, section or part.
4. The brief description of the items given in the Bills of Quantities are for the purpose of establishing a standard to which the sub-contractor shall adhere to. Otherwise alternative brands of **equal** and **approved** quality will be accepted.

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

5. The grand total of prices in the price summary page must be carried forward to the **Form of Tender**.
6. For consideration and qualification, tenderers must submit, together with their tenders, a coloured brochure detailing technical specifications and literature of the equipment they intend to offer.

# **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 AIR- CONDITIONING SERVICES**

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE KSHS.	TOTAL KSHS.
<b><u>PRELIMINARIES AND GENERAL CONDITIONS</u></b>					
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					

**THIRD FLOOR AIRCONDITIONING INSTALLATIONS**

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE KSHS.	TOTAL KSHS.
A	<p><b>VRF or VRV AIR CONDITIONING SYSTEM</b></p> <p><b>5.6 kW ductable Indoor Units Serving:</b>  <b>Bedroom and bedroom 3 - 2 No.</b>  <b>Study Room - 1 No.</b>  <b>Dining - 1 No.</b></p> <p>Supply and install a ductable concealed type direct expansion air conditioning indoor unit complete with the following:-</p> <ul style="list-style-type: none"> <li>. <b>Cooling capacity : 5.6 kW evaporator</b></li> <li>. A wired or wireless remote controller</li> <li>. A refrigerant (R410A) initial charge</li> <li>. Thermostat to control room temperature</li> <li>. Inbuilt condensate drain pump</li> <li>. 5m long insulated drain hose of 25mm diameter</li> <li>. Auto restart function</li> <li>. Air purifying filter as plasma filter or approved equivalent</li> <li>. Ceiling mounting kit</li> </ul> <p>The indoor units to have a power surge protector and to be as TOSHIBA' indoor unit model MMD-AP0181BH, approved or equivalent.</p>	No	4		
B	<p><b>7.1 kW ductable Indoor Unit serving</b>  <b>Master Bedroom - 2 No.</b>  <b>Bedroom 2 - 1 No.</b>  <b>Guest Ensuite - 1 No.</b></p> <p><u>Supply and install a ductable concealed type direct expansion air conditioning indoor unit complete with the following:-</u></p> <ul style="list-style-type: none"> <li>. <b>Cooling capacity : 7.1 kW evaporator</b></li> <li>. A wired or wireless remote controller</li> <li>. A refrigerant (R410A) initial charge</li> <li>. Thermostat to control room temperature</li> <li>. Inbuilt condensate drain pump</li> <li>. 5m long insulated drain hose of 25mm diameter</li> <li>. Auto restart function</li> <li>. Air purifying filter as plasma filter or approved equivalent</li> <li>. Ceiling mounting kit</li> </ul> <p>The indoor units to have a power surge protector and to be as TOSHIBA' indoor unit model MMD-AP0241BH, approved or equivalent.</p>	No	4		
<b>TOTAL CARRIED TO NEXT PAGE</b>					

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE KSHS.	TOTAL KSHS.
A	<p>B/F</p> <p><b>9.0 kW ductable Indoor Unit serving</b>  <b>Lounge - 1 No.</b>  <b>Gym - 1 No.</b>  <b>Sitting - 1 No.</b>  <b>Waiting Lounge - 1 No.</b></p> <p>Supply and install a ductable concealed type direct expansion air conditioning indoor unit complete with the following:-</p> <ul style="list-style-type: none"> <li>. <b>Cooling capacity : 9.0 kW evaporator</b></li> <li>. A wired or wireless remote controller</li> <li>. A refrigerant (R410A) initial charge</li> <li>. Thermostat to control room temperature</li> <li>. Inbuilt condensate drain pump</li> <li>. 5m long insulated drain hose of 25mm diameter</li> <li>. Auto restart function</li> <li>. Air purifying filter as plasma filter or approved equivalent</li> <li>. Ceiling mounting kit</li> </ul> <p>The indoor units to have a power surge protector and to be as TOSHIBA' indoor unit model MMD-AP0301BH.</p>	No	4		
B	<p><b>11.2 kW ductable Indoor Unit serving</b>  <b>Sunken Lounge 1 No.</b>  <b>Office 1 No.</b>  <b>Theater 1 No.</b>  <b>Dry kitchen Lounge 1 No.</b></p> <p><u>Supply and install a ductable concealed type direct expansion air conditioning indoor unit complete with the following:-</u></p> <ul style="list-style-type: none"> <li>. <b>Cooling capacity : 11.2 kW evaporator</b></li> <li>. A wired or wireless remote controller</li> <li>. A refrigerant (R410A) initial charge</li> <li>. Thermostat to control room temperature</li> <li>. Inbuilt condensate drain pump</li> <li>. 5m long insulated drain hose of 25mm diameter</li> <li>. Auto restart function</li> <li>. Air purifying filter as plasma filter or approved equivalent</li> <li>. Ceiling mounting kit</li> </ul> <p>The indoor units to have a power surge protector and to be as TOSHIBA' indoor unit model MMD-AP0361BH.</p>	No	2		
<b>TOTAL CARRIED FORWARD TO NEXT PAGE</b>					



ITEM NO.	DESCRIPTION	UNIT	QTY	RATE KSHS.	TOTAL KSHS.
A	<p><b>B/F Outdoor Unit</b>  Floor mounted inverter controlled outdoor unit capable of supplying 16 No. indoor units at the same time as described in items above. It shall have an outdoor units with nominal cooling load of 76.5 kW , and capacity control of 100% according to the indoor cooling load. The unit shall be suitable for installations with piping length of 200m and elevation up to 45m and cooling operation range of -5C - 43C. The unit will operate with R410A refrigerant, any other non-ozone depleting refrigerant. It shall be provided with power surge protector purpose-made protective steel iron angle frame and all other anchoring accessories including raw bolts complete with anti-vibration rubber mountings.  The Outdoor unit to be as 'TOSHIBA' model no. MMY-AP2614HT8-E</p>	No.	2		
B	<p><b>Control Cable Installation Works</b>  Allow for wiring and conduit works including but not limited to interconnecting cable between the outdoor unit, indoor units, wired remote control and control system. The transmission cable to be CVV-SB 1.25mm<sup>2</sup> x 2C</p>	Lm	64		
C	<p><b><u>REFRIGERANT PIPING</u></b>  <b>Copper Pipework and Insulation</b>  Supply, deliver and install copper tubing to BS 2871: part1 and capillary and compression fittings to BS 864: part 2. Tubing must be solid drawn round, clean, smooth and free from defects and from deleterious films in the bore. The fittings must be free from internal fins or other irregularities. Compression fittings shall be Type A (non-manipulative). Allow in pipework prices for pipe support, clips and cradles, bends, tees, insulation, branches, joining fixing and any other accessories for proper and satisfactory functioning of the system.   The insulation shall be (1/2)" thick Nitrile Rubber Foam in sleeve form. The piping shall be pressure tested at 1.5 times the working pressure.</p>				
D	9.52 Dia copper refrigerant pipe	LM	38		
E	15.88 Dia ditto	LM	22		
<b>TOTAL CARRIED FORWARD TO NEXT PAGE</b>					

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE KSHS.	TOTAL KSHS.
	<b>B/F</b>				
A	19.05 Dia ditto	LM	24		
B	22.2 Dia ditto	LM	20		
C	28.58 Dia ditto	LM	38		
D	34.92 Dia ditto	LM	38		
	<b><u>REFNET/ Y-JOINTS</u></b>				
E	Supply & Installation High Pressure refnets /"Y" Joints with respective cooling capacities as per indoor units combinations	No.	7		
	<b>PVC Drain Pipework</b>				
F	Supply and install uPVC pipes for drainage of the indoor units. The pipes are to B.S 5235 with fittings fixed as per the manufacturer's instructions and BS 5572. Tenderer must allow in their prices for all sizes of connectors, adapters, socket, reducers, holderbats, clips joints and tees required for the satisfactory running of the system. The pipes must be Insulated				
G	25mm diameter -ditto-	LM	102		
H	25mm diameter tee	No	8		
I	25mm diameter bend	No	18		
J	25mm diameter U-trap	No	2		
<b>TOTAL CARRIED FORWARD TO NEXT PAGE</b>					

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE KSHS.	TOTAL KSHS.
A	B/F <b>DUCTING, INSULATION &amp; DIFFUSERS</b>  300 mm dia Slot Grilles	No	60		
B	Insulated Aluminium Flex Duct 150mm	LM	68		
C	Uninsulated Aluminium Flex Duct 150mm	LM	68		
D	Pre-insulated duct, Tees, bends and plenums	SM	104		
<b>TOTAL CARRIED FORWARD TO COLLECTION PAGE</b>					

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE KSHS.	TOTAL KSHS.
A	<p><b>B/F</b></p> <p><b><u>Trunking</u></b></p> <p>Allow for 150 x 50mm powder coated steel sheet trunking mounted on the wall or ceiling with wall matching colour as shall be directed on site for concealing the refrigerant and drain pipes.</p>	LM	55		
B	<p><b>Electrical Works</b></p> <p>Allow for associated electrical works including but not limited to wiring from local isolators provided by others within one meter to all indoor units, outdoor units and control system. Allow for labeling all the circuits and equipment.</p>	Item	1		
C	<p><b>Cleaning and Flushing the Installation</b></p> <p>Allow for cleaning and flushing the whole installation with appropriate medium before charging the system with refrigerant.</p>	Item	1		
D	<p><b>Training of maintenance staff and operators</b></p> <p>Allow for training of three personnel on the operation and maintenance of the air conditioning installation. The training to be structured such that the personnel will undergo a course on the working of the machines, operations, settings, trouble shooting and maintenance of the machines.</p>	Item	1		
E	<p><b>As-built Drawings and Maintenance Manuals</b></p> <p>Allow for preparation of as-built drawings and maintenance manuals. All these will be handed to Project Engineer in three copies and soft copies in 2 CD formats</p>	Item	1		
F	<p><b>Testing and Commissioning</b></p> <p>Allow for testing and commissioning of the air conditioning installations to the satisfaction of the Engineer. All tests to be recorded, signed by the contractor and approved by engineer. All tests reports to be included in O&amp; M manuals</p>	Item	1		
	<b>CARRIED TO COLLECTION PAGE</b>				

**KITCHEN EXTRACTION INSTALLATIONS**

**MAIN HOUSE AND GAZEBOs**

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE KSHS.	TOTAL KSHS.
A	<b><u>KITCHEN HOOD</u></b> 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	<b><u>KITCHEN EXTRACT FAN</u></b> 0.025 kW Extract fan as S & P HCM - 150N, Q = 400 m3/h; 1900 RPM Single phase; complete with: INT / ATEX ATEX stop-run; wall mounted; CABLE BOX, C2V adaptors 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					

**MAIN SUMMARY FOR MECHANICAL SERVICES**

ITEM NO.	DESCRIPTION	AMOUNT KSHS.
	BROUGHT FORWARD FROM	
1	PRELIMINARIES AND GENERAL CONDITIONS	
2	AIR CONDITIONING SYSTEM	
3	TOILET EXTRACTION ( FROM T.EXTRACTION DOC)	
4	CONTINGENCY SUM	500,000.00
	TOTAL CARRIED TO EXECUTIVE SUMMARY	
	16 % VAT	
	TOTAL CARRIED TO FORM OF TENDER	

Total in words: .....

Name of Contractor: .....

Address: .....

Telephone:.....

Pin. No. .... Vat Reg. No. ....

Signature: .....

Official Stamp/Date: .....