



CLARIFICATIONS FOR PROCUREMENT OF GOODS AND RELATED SERVICES ON THE AC TEST LABORATORY

RFP: 5610200-02/IFB/QCBS/01/20

SI	Ref	Question	Answer
1	Section 5	Is the HVAC equipment already in place and just needs testing? -	No. By this solicitation, MiDA is seeking to procure this equipment.
2	Section 5: SR1	What are the specific requirements for the contract (times for completion, job requirements, etc)?	The details are all provided in the solicitation document – Section V: Schedule of Requirements

SI	Ref	Question	Answer
3	Section 5: SR1	<p>1) Delivery time – we had discussions with major producers of the equipment which is required and we understand that out of the small number of suppliers available, considering that this will be a custom made project, and considering the production time, plus factory testing, customer visit, shipping etc., altogether the time required for final delivery will be far more than the 16 weeks indicated as “Latest Delivery date”. We would safely assume that time required for completion will be close to 50 weeks, however all efforts will be done to reduce the time, considering also the financial effort for supporting all production costs and delivery as well. For this reason we kindly request an extension of the Latest Delivery Date to 50 weeks instead of 16;</p>	<p>MiDA/GSA would prefer if Bidders could keep to the Latest delivery time period of 16 weeks. However, Bidders also have the option of proposing an alternate schedule based on their ability to deliver the appropriate equipment and competitive pricing, with a clear explanation of their rationale for delivery schedule and prices for MiDA’s consideration. This IFB was developed based on an RFI (Request for Information) sent to suppliers.</p>
4	Section VI: Clause 14/Section VIII Contract Forms	<p>Payment terms – as indicated above with reference to production timing and financing of production, we propose to approve the possibility to pay an advance up to 30% of the contract value, subject to presentation of an Advance Payment Bond under the format provided in the tender documents; payment should be made within 30 days of receipt of invoice and bond;</p>	<p>No Advanced Payment. See SCC 14.4</p>

SI	Ref	Question	Answer
5	Section 5: SR5	Regarding the pre-delivery inspection please clarify which party shall bear the costs and eventually please share details about the inspection team, time required etc.	The predelivery inspection will be carried out by two officials of MiDA's and GSA's internal review team, as stipulated by the contract, and the costs will be the responsibility of the Supplier.
6	Letter of Invitation; ITB BDS 1.1	Please confirm that the scope of supply is for one (1) balanced ambient test chamber capable of testing a maximum 12 KW air conditioner in a free air "through the wall" configuration and one (1) refrigerator test chamber.	Confirmed.
7		Please confirm that the scope of supply is strictly limited to the items in the attached document "AC TEST SPECS JAN 2020.PDF	The scope of supply is as stipulated by the IFB document: "The supplied equipment must be capable of conducting the tests specified by all applicable parts of Ghana Standard GS 362:2017 (<i>Non-ducted air conditioners and heat pumps - Testing and rating for performance</i>), International Standard ISO 5151:2017(E) (<i>Non-ducted air conditioners and heat pumps - Testing and rating for performance</i>), International Standard ISO 13253:2017 (<i>Ducted air conditioners and air-to-air heat pumps - Testing and rating for performance</i>) and International Standard ISO 15042: 2017 (<i>Multiple split-system air conditioners and air-to-air heat pumps – Testing and rating for performance</i>).

SI	Ref	Question	Answer
8	Section V: Technical Schedule & Compliance	Please clarify whether or not a Supervisory Control and Data Acquisition (SCADA) system for equipment in the scope of supply is within the scope of supply	Per the IFB, the minimum requirement is a system that is capable of conducting the specified test procedures, as well as record and store test data. Bidders can propose a system that they deem appropriate, but the final selection will be based on the systems meeting the minimum requirements at a competitive price.
9	Section V: Technical Schedule & Compliance	Please clarify the number of refrigerator test stands required in the refrigerator test room and the maximum electrical power drawn by each refrigerator	The minimum number of refrigerator test stands is 2, each capable of delivering a maximum of 600W.
10	Section V: Technical Schedule & Compliance	Please clarify whether or not the refrigeration systems on the test facilities are expected to be water or air cooled	The refrigeration systems on the test facilities are expected to be water cooled.
11	General	Please clarify who's responsibility it will be to provide test pieces (air conditioner(s) and refrigerator(s)) for factory acceptance and field acceptance testing	It will be GSA's responsibility to supply AC(s) and refrigerator(s) for field acceptance testing in Ghana. It will be the Supplier's responsibility to supply test units for factory acceptance testing.

SI	Ref	Question	Answer
12	General	Please clarify clear height of the building in which the equipment will be installed	Please refer to the containment building blueprint attached.
13	General	Please clarify whether or not the test facilities will be installed in a pit in the floor so that the test chamber floors are level with the building and if not who's responsibility	Please refer to the containment building blueprint and provide comments as necessary.
14	General	If the equipment is not installed in a pit, please clarify who's responsibility it is to provide ramps, stairs, platforms, or other floor level needs in front of the chambers	Based on the containment building blueprint, the bidder is required to propose ramps, stairs, platforms, or other floor level needs for use with their proposed test chamber.
15	General	Please confirm that utility supply including but not limited to main facility power, chilled water, softened water, deionized water, city water, and compressed dry oil free air are the responsibility of the BUYER	Confirmed. Please refer to the containment building blueprint, and indicate the necessary requirements for main facility power, chilled water, softened water, deionized water, city water, and compressed dry oil free air, etc. appropriate for the system being proposed by the bidder.

SI	Ref	Question	Answer
16	General	Please clarify the responsibilities of the supplier relative to the buyer as to material handling, equipment rental, utility connection to the facilities and building penetrations.	Please refer to the containment building blueprint, and indicate the necessary requirements for main facility power, chilled water, softened water, deionized water, city water, and compressed dry oil free air, etc. appropriate for the system being proposed by the bidder, to be provided by MiDA/GSA as part of the containment building. It is the bidder's responsibility to secure the services of local partner for material handling, equipment rental, etc. in order to deliver a functioning test facility as specified by the IFB.
17	Section V: Technical Schedule & Compliance	From the technical specifications, we know that it's a 12KW AC Balanced Ambient Room-Type Calorimeter required. We want to find out whether we should include the test gases in the setup. Which of the two gas options R32 or R290 should be included for the prototypes to be tested? If the answer about addition of the test gases is yes, then as part of a safety measure our test lab will require us to add anti-explosion safety precautions. We must however point out these additions may add up to the total cost of the AC test laboratory.	As Ghana has ratified the UNFCCC, the Kyoto Protocol, the Vienna Convention, the Montreal Protocol, and is engaged in the implementation of the first stage of the HCFC Phase-out Management Plan (HPMP), GSA is expecting to be testing more and more products with R32 and R290 with this laboratory. Please include the necessary safety measures for testing products with R32 and R290.
18	General	Regarding the lab area, there're some requirements below that needs to be considered and factored into the civil works for the AC test laboratory. Please find attached the two layouts for details. a) Chamber size is 12000mm (L) x6000mm (W) x4500mm (H) , Necessary surface is 14500mm (L) x9000mm (W).	Please refer to the containment building blueprint and provide comments as needed.

SI	Ref	Question	Answer
19			Please refer to the containment building blueprint and provide comments/requirements for the proposed test chamber as appropriate.
			Please refer to the containment building blueprint and provide comments/requirements for the proposed test chamber as appropriate.
20			Please refer to the containment building blueprint and provide comments/requirements for the proposed test chamber as appropriate.
21		b) Should dig a hole with drainage device of dimension : 12000mm (L) x6000mm (W) x700mm (deep) . And the height of place is ≥4200mm. Please does the available space dedicated for the installation of the AC test laboratory meet the	Please refer to the containment building blueprint and provide comments/requirements for the proposed test chamber as appropriate.

SI	Ref	Question	Answer
22		<p>dimensions above as indicated in the drawings? Total Power requirement of laboratory is 150KVA (Operational rate is 50% to 85%. Please provisions must be made for the main power breaker that meets these specifications for the installation the power panel of the AC test laboratory.</p> <p>Water supply : clean water, at the rate of 500L/h. Drainage : matching pipe connection diameter : DN100 The ground bearing must be 800kg/m² at least.</p> <p>As per the requirements in the tender document, there's only one set of Balanced Ambient Room-Type Calorimeter according to the standard. However, no details about which material, models or configurations of the AC test laboratory were given. Please kindly specify in details the material, the models and configurations required for the compressor, power meter, acquisition instrument, sensors and other equipment/devices that will be configured for the AC test laboratory, otherwise the laboratory quality could not be guaranteed</p>	<p>Please refer to the containment building blueprint and provide comments/requirements for the proposed test chamber as appropriate.</p>

SPECIAL SPECIFICATIONS:

Electrical Distribution Design Specification

Lighting Electrical Loads (indicative)

Lighting		
Area Description	Illuminated Area (m ²)	Lighting Power Density (w/m ²)
General Laboratory Hall	245.74	12
Changing room	6.96	10
Open Stairwell to Mezzanine		16
Offices	33.20	12
Restroom	9.55	11

Non-Lighting Electrical Loads (indicative)

Non-Lighting Electrical Loads	
Description	Circuit Rating
3 Phase Convenience Receptacles (total of two plugs)	3 phase / 400 V / 36 A
Single Phase Convenience Receptacle (10 total – 2 each wall two in office)	Single Phase / 240 V / 125 A
Office Room Air Conditioning Unit	3 Phase / 400 V / 36 A
BARC Test Laboratory Power Supply	
- Three (3) - 3-Phase circuits	3 Phase / 400 V / 200 kVA

Electrical circuits must all be equipped with appropriate overload protections with all switching for three phase power circuits equipped with manual lockout features.

Electrical Wiring Design Standards

All electrical wiring, distribution, and protections shall be according to British Standard 7671. Electrical protections will be in place to protect laboratory equipment from external power surges from the main grid and lightning strikes.

Panel Capacity

Electrical distribution panels and wiring shall be designed to accommodate future reasonable expansion in the laboratory facility and safety protections as recommended by the BS 7671 standard.

Power Quality Features

At the facility level, the building electrical service shall be designed with appropriate equipment to ensure regulation of distribution voltage and frequency of grid supplied electricity within limits defined by the national electrical code.

Cathodic Protection

Steel structural elements for the buildings shall be equipped with cathodic protection as appropriate.

Power Backup Transfer Switch

The facility main power distribution panel will be equipped with switching equipment and features to transfer power supply to a backup generator in the event of a power failure.

Water Services

Plumbing Standards

All plumbing of fresh water and sanitary sewer shall be in accordance with the national building control framework and other recognized national standards.

Water Service

Provision of water supply from the water supply main at the GSA campus to the BARC containment building. Water services to be included for all toilet facilities and two convenience water supply taps: (1) tap located on the exterior of the building and (1) tap located on an interior wall of the building to supply the BARC laboratory.

Water Supply Standard

The water supply service must be guaranteed to the laboratory at a flow rate of 100 m³/h and mains pressure of 10 meters of head at 1 bar.

Sewage and Drainage

The building shall be equipped with waste water service for all toilets and sinks. Sewage shall be transferred for treatment to an existing, on site treatment system or a newly constructed septic system as part of the building which meets all applicable codes.

The interior of the building shall be with a floor drainage system which has the capacity to mitigate spills from all water supply sources in the building simultaneously. Floors shall be designed at an appropriate grade to ensure any spills or leaks are directed to interior floor drains. Drains will be included for two toilets and the main space of the BARC containment building with capacity to adequately mitigate typical spill events.

SR1. SITE LOCATION AND DRAWINGS

CONCEPTUAL DESIGN DRAWINGS

FOR THE PROPOSED GSA (Ghana Standards Authority) AC TEST LABORATORY BUILDING



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CLIENT  Millennium Development Authority <small>Research, Innovation and Planning for Modernisation</small>	OWNER  GHANA STANDARDS AUTHORITY	PROJECT AC Test Laboratory Building	ARCHITECT Juste G. Kodja	REVISIONS			Project number: Drawn by: Juste G. Kodja Checked by: Date: April 2019	Sheet Title: Drawings Cover Page Sheet number: A00 Scale:
				No:	DESCRIPTION:	DATE:		
4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA	Gulf Street, Accra GHANA	LOCATION Okponglo Greater, Accra-Region GHANA	ENGINEER					



Google Earth Satellite Imagery (2019)

CLIENT :  Millennium Development Authority <small>Enabling Growth and Prosperity for All</small> <small>4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA</small>	OWNER :  GHANA STANDARDS AUTHORITY <small>Gulf Street, Accra GHANA</small>	PROJECT : AC Test Laboratory Building LOCATION : Okponglo Greater, Accra-Region GHANA	ARCHITECT : Juste G. Kodja ENGINEER :	REVISIONS :			Project number :	Sheet Title :						
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						Date : April 2019								

Enlarged views of the project site

Satellite view of the site



Picture of the site (02/21/19)

(Showing the existing Estate Department Building to be demolished and existing trees. Only the trees on the footprint or any access pathway of the new building shall be removed)

<p>CLIENT :  Millennium Development Authority <small>Research, Develop and Promote Innovation</small></p>	<p>AGENCY :  GHANA STANDARDS AUTHORITY</p>	<p>PROJECT : AC Test Laboratory Building</p>	<p>ARCHITECT : Juste G. Kodja</p>	<p>REVISIONS :</p> <table border="1"> <thead> <tr> <th>No :</th> <th>DESCRIPTION :</th> <th>DATE :</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	No :	DESCRIPTION :	DATE :										<p>Project number : Drawn by : Juste G. Kodja Checked by : Date : April 2019</p>	<p>Sheet Title: Proposed Site (Enlarged view) Sheet number: A02 Scale:</p>
No :	DESCRIPTION :	DATE :																
<p>4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA</p>	<p>Gulf Street, Accra GHANA</p>	<p>LOCATION : Okponglo Greater, Accra-Region GHANA</p>	<p>ENGINEER :</p>															

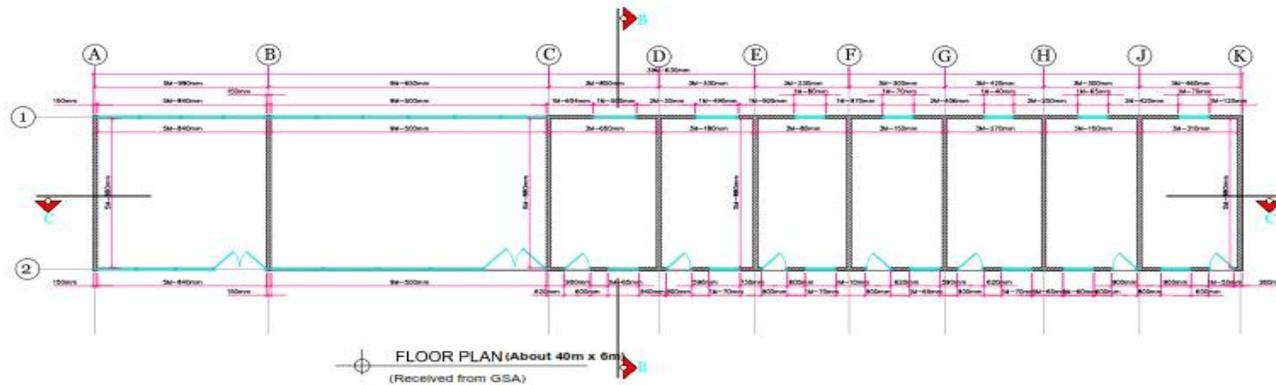


Front View

**Existing Estate
Department building
(To be demolished)**



Back View

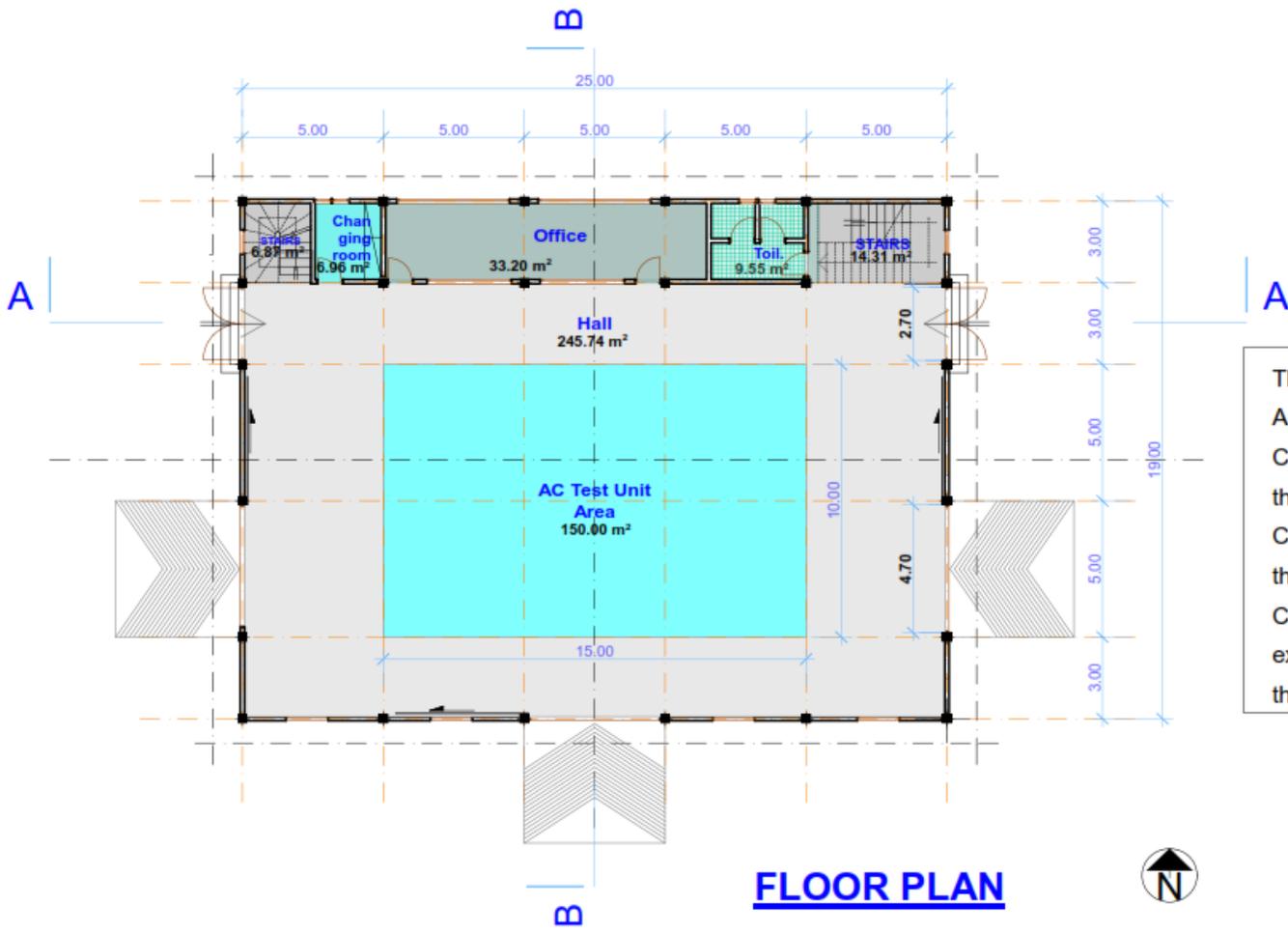


CLIENT :  Millennium Development Authority <small>Millennium Development Authority</small> 4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA	OWNER :  GHANA STANDARDS AUTHORITY Gulf Street, Accra GHANA	PROJECT : AC Test Laboratory Building LOCATION : Okponglo Greater, Accra-Region GHANA	ARCHITECT : Juste G. Kodja ENGINEER :	REVISIONS :			Project number : Drawn by : Juste G. Kodja Checked by : Date : April 2019	Sheet Title: Existing building (To be demolished) Sheet number: A03 Scale:
				No : DESCRIPTION : DATE :				



Site Plan

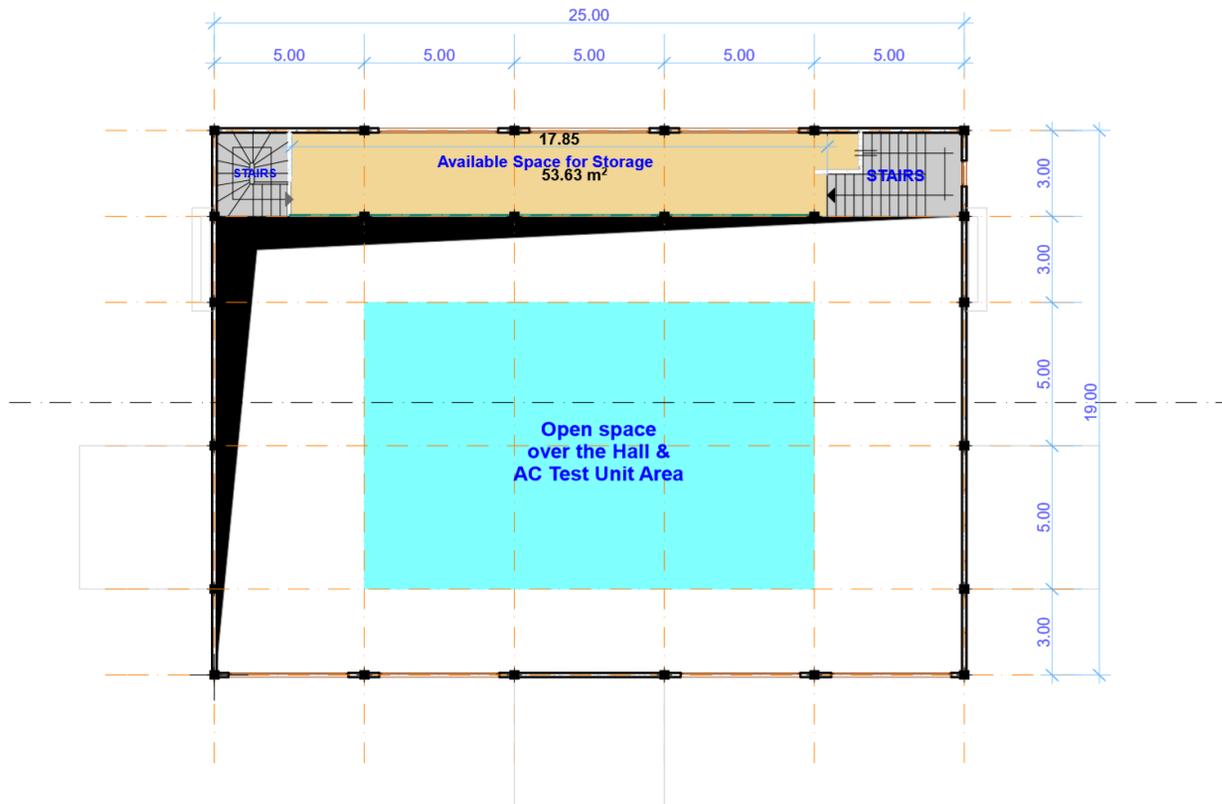
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				No :	DESCRIPTION :	DATE :	Drawn by : Juste G. Kodja
LOCATION : Okponglo Greater, Accra-Region GHANA				ENGINEER :	Checked by :	Date : April 2019	Scale :



Notes:
 The dimensions are Approximate and the Contractor is referred to the site and the Contractor in charge of the AC Testing Facility Chamber to ascertain the exact size and extent of the Works.

FLOOR PLAN

CLIENT: Millennium Development Authority	OWNER: GHANA STANDARDS	PROJECT: AC Test Laboratory Building	ARCHITECT: Juste G. Kodja	REVISIONS:		Project number : _____	Sheet Title: Floor Plan
				No : _____	DESCRIPTION : _____	DATE : _____	Drawn by : Juste G. Kodja
						Checked by : _____	



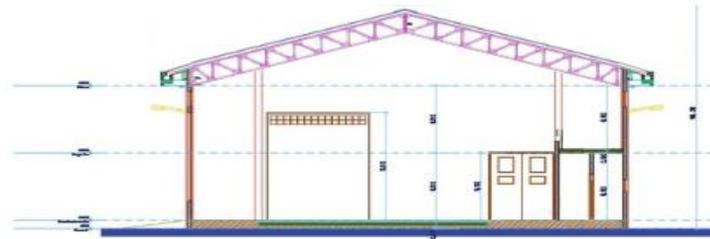
MEZZANINE



Notes:

The dimensions are Approximate and the Contractor is referred to the site and the Contractor in charge of the AC Testing Facility Chamber to ascertain the exact size and extent of the Works.

CLIENT :  Millennium Development Authority <small>Economic Growth and Poverty Reduction</small> 4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA	OWNER :  GHANA STANDARDS AUTHORITY Gulf Street, Accra GHANA	PROJECT : AC Test Laboratory Building LOCATION : Okponglo Greater, Accra-Region GHANA	ARCHITECT : Juste G. Kodja ENGINEER :	REVISIONS :			Project number :	Sheet Title:
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Section BB

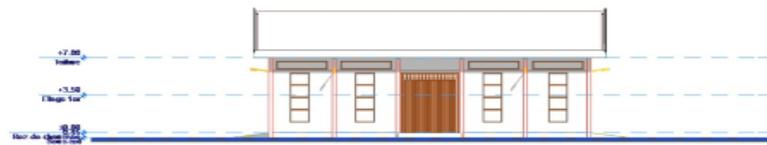


Section AA

Notes:

The conceptual design and associated drawings are for illustration purposes only. The Contractor is required to submit all the developed and detailed drawings, including the roofing and the strairs details to the Supervising Engineer.

CLIENT :  Millennium Development Authority <small>Research, Growth and Priority Initiatives</small> 4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA	GOVERNOR :  GHANA STANDARDS AUTHORITY Gulf Street, Accra GHANA	PROJECT : AC Test Laboratory Building LOCATION : Okponglo Greater, Accra-Region GHANA	ARCHITECT : Juste G. Kodja ENGINEER :	REVISIONS :			Project number :	Sheet Title :
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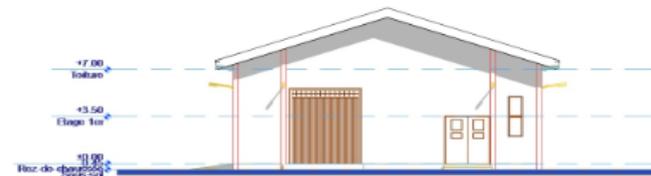
South View



West View



North View



East View

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				No :	DESCRIPTION :	DATE :	Drawn by : Juste G. Kodja	Checked by :
LOCATION : Okponglo Greater, Accra-Region GHANA				ENGINEER :	Date : April 2019	Scale :		



Rendering -
Interior
views



CLIENT :  Millennium Development Authority <small>Ensuring Growth and Prosperity for All</small> 4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA	OWNER :  GHANA STANDARDS AUTHORITY Gulf Street, Accra GHANA	PROJECT : <u>AC Test Laboratory Building</u> LOCATION : Okponglo Greater, Accra-Region GHANA	ARCHITECT : Juste G. Kodja ENGINEER :	REVISIONS :			Project number : Drawn by : Juste G. Kodja Checked by : Date : April 2019	Sheet Title: 3D Views (Interior views) Sheet number: A09 Scale:
				No : DESCRIPTION : DATE :				



Rendering - Exterior views



<p>CLIENT :  Millennium Development Authority <small>Ensuring Growth and Prosperity for All</small> 4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA</p>	<p>OWNER :  GHANA STANDARDS AUTHORITY Gulf Street, Accra GHANA</p>	<p>PROJECT : AC Test Laboratory Building</p> <p>LOCATION : Okponglo Greater, Accra-Region GHANA</p>	<p>ARCHITECT : Juste G. Kodja</p> <p>ENGINEER :</p>	<p>REVISIONS :</p> <table border="1"> <thead> <tr> <th>No :</th> <th>DESCRIPTION :</th> <th>DATE :</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	No :	DESCRIPTION :	DATE :										<p>Project number :</p> <p>Drawn by : Juste G. Kodja</p> <p>Checked by :</p> <p>Date : April 2019</p> <p>Project number :</p> <p>Sheet Title : 3D Views (Exterior views)</p> <p>Sheet number : A10</p> <p>Scale :</p>
No :	DESCRIPTION :	DATE :															

DOORS SCHEDULE					
Door Size (mm)	Width (mm)	Rough Height (mm)	Count	Location	Type & Finish
4700 x 5600	4700	5600	3	Exterior doors, Front (South), West & East	Sliding metal doors
2700 x 3500	2700	3500	2	Exterior doors, West & East	Exterior Metal doors with glass windows
800 x 2100	800	2100	4	Interior, Changing room & Toilets	Hardwood doors
800 x 2100	800	2100	2	Interior Office room	Glass door (Half glass) with Aluminum frame

WINDOWS SCHEDULE					
Width (mm)	Height (mm)	Head Height (mm)	Count	Location	Type & Finish
1500	4600	5600	4	Front (South)	Sliding Glass Windows with aluminum frame + Grill (burglar proof)
4000	800	6700	4	Front (South)	
4000	800	3200	2	Back (North)	
4000	800	6700	3	Back (North)	
600	600	2100	3	Back (North)	
900	3000	5000	2	Stairs (East & West)	
3000	1400	2100	2	Interior Office	

Doors - Windows & Rooms Schedules

Note:

The dimensions and quantities at this step, are given as an indication only.

ROOMS SCHEDULE				
Rooms	Area (m ²)	Floor	Finish Wall	A/C
AC Test Lab	398.4			
AC test Unit Area	150	heavy-duty industrial floor tiles		
Available space around the AC Test Unit	248.4		Paint	
Office room	27.9		Paint	AC
Changing room	6.00		Paint	AC
Toilets	9.55	porcelain stoneware floor tiles	Ceramic wall tiles	
Storage (Mezzanine)	45.00		Paint	
Stairs	27.52		Paint	

<p>CLIENT :</p> <p>Millennium Development Authority <small>Business Growth and Poverty Reduction</small></p> <p><small>4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA.</small></p>	<p>OWNER :</p> <p>GHANA STANDARDS AUTHORITY</p> <p><small>Gulf Street, Accra GHANA</small></p>	<p>PROJECT :</p> <p style="text-align: center;"><u>AC Test Laboratory Building</u></p> <p>LOCATION :</p> <p style="text-align: center;"><small>Okponglo Greater, Accra-Region GHANA</small></p>	<p>ARCHITECT :</p> <p>Juste G. Kodja</p> <p>ENGINEER :</p>	<p>REVISIONS :</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No :</th> <th>DESCRIPTION :</th> <th>DATE :</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	No :	DESCRIPTION :	DATE :							<p>Project number :</p> <p> </p> <p>Drawn by :</p> <p>Juste G. Kodja</p> <p>Checked by :</p> <p> </p> <p>Date :</p> <p>April 2019</p>	<p>Sheet Title :</p> <p style="text-align: center;">Schedules</p> <p>Sheet number :</p> <p style="text-align: center;">A11</p> <p>Scale :</p> <p> </p>
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1. GENERAL REQUIREMENTS

A. DESCRIPTION AND SCOPE:

Frame Structure and Finishings

The building is a concrete frame structure made up of reinforced concrete foundations, reinforced concrete columns, walls with sandcrete blocks as infills and partitions. Roofing is aluminum roofing sheet.

Finishings are generally glass windows with aluminum frame, exterior metal doors and interior hardwood doors, heavy-duty industrial floor tiles (main hall), ceramic wall tiling (toilets), painted walls. Installations generally include Electrical, Plumbing, Fire safety and Air-conditioning Installations for the office area.

B. GENERAL SPECIFICATIONS OF MATERIALS AND WORKMANSHIP

1. The Contractor should all the times abide by the relevant internationally accepted Codes of practice (or equivalent US standards); any need for further clarification shall be addressed to the Supervising Engineer (Engineer) on site.
2. All materials shall be new and, in all cases, where the quality of materials is not described or otherwise specified, it is to be the best quality obtainable and approved by the Engineer. Also, Materials choice shall be based on the maintenance costs.

C. VISITING SITE

The Contractor is required to visit the Site and ascertain for himself all local conditions and restrictions likely to affect the Design and Works. No claim for lack of knowledge in this respect will be accepted. The dimensions and quantities where stated, are Approximate and the Contractor is referred to the site to ascertain the exact size and extent of the Works.

The contractor is to satisfy himself as to any difficulties that the situation may present and to make all necessary enquires to any points which in his opinion required further elucidation as no claim for lack of information on any of the above will be entertained.

D. TESTS AND SAMPLES

Unless otherwise described in the tender documents, the Contractor will be responsible for all the costs involved in testing materials. The cost of replacing materials fixed or placed in position which do not comply with the required test results or approved samples shall be borne solely by the Contractor.

E. SAFETY ON SITE AND SURROUNDINGS

The Contractor shall be responsible for:

1. All personnel and workers safety requirements. The provision of full Personal Protective Equipment for entering hazardous zones is the Contractor’s responsibility.
2. Noise and Pollution Control in relation to any demolition and construction works
3. Maintain Surrounding Buildings
4. Maintain Public and Private Roads
5. Maintain Live Services

2 – SITE PREPARATION (Demolitions, Trees removal, earthwork...)

1. The parking next to the works area shall be closed and the entire works area shall be securely fenced around the perimeter. Provision of warning, safety and alert signs shall also be made
2. It is the responsibility of the Contractor to ensure that the demolitions of the existing Estate Department Building and trees removal will be carried out in a manner conducive to public and all personnel and workers safety. This includes but not limited to:
 - A demolition and trees removal set-up inspection in accordance with GSA and MiDA prior to the demolition to determine if any special conditions exist.
 - During the demolitions, no free-standing walls will be allowed, dust control shall be maintained all times
 - After demolition and trees removal are completed, the site shall be left in a safe, clean, and sanitary condition, insuring that all foundations, debris, construction materials, furnishings, trash, garbage, etc. are completely removed.

3 – CONCRETE

All concrete works, Steel Reinforcing Bars, Cementitious Material must comply with the required standards.

 Millennium Development Authority <small>Authority for Growth and Sustainable Development</small> 4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA	 GHANA STANDARDS AUTHORITY Gulf Street, Accra GHANA	PROJECT: AC Test Laboratory Building LOCATION: Okponglo Greater, Accra-Region GHANA	ARCHITECT: Juste G. Kodja	REVISIONS:			Project number : Drawn by : Checked by : Date :	Sheet Title: General Notes Sheet number: A12.a Scale:
			ENGINEER:	No : DESCRIPTION : DATE :	Drawn by : Juste G. Kodja Checked by : Date : April 2019			

4 - MASONRY

1. The cement used in the manufacture of the blocks shall be normal Portland cement or rapid hardening Portland cement conforming to the provisions of the IBC2018.
2. The aggregate used in the manufacture of blocks shall consist of naturally occurring sand, gravel or stone, crushed or uncrushed or a combination thereof. It shall be hard, strong, durable, clean and free from adherent coatings and shall not contain excessive quantities of flat or elongated particles.
3. Coordination with all others trades and specialists in charge of the installation of the AC Test Facility chamber inside the building to ensure that all parts of the containing building are properly located and sized. Also, any pre-cabing or utilities connection needed shall be placed.
4. Provide temporary bracing during erection of masonry work where required and maintain in place until building structure provides permanent bracing.

5 – METALS

Steel for trusses, exteriors doors, windows grill (burglar proof), stairs and mezzanine railing, including reinforcing steel and miscellaneous shapes, plates, beams and angles, etc., as required for framing members and connections.
All steel exposed to the weather shall be galvanized. Field paint all interior and exterior exposed steel.

6 – WOOD (Interior doors, mezzanine railing etc)

1. All interior hardwood doors must be constructed with best quality of materials available. Obtain approval from the Engineer for type and material selection. Construct as shown on the drawings
2. Protect against dampness before and after delivery. Store materials under cover in a well-ventilated enclosure and protect against extreme changes in temperature and humidity.

7 – ROOFING

Use non-corrosive, long span corrugated roofing sheets or approved equal in roofing systems as indicated on drawings. Based on the site condition and basis of design, the roof shall be design and constructed in conformity to the required standards.

8 – ALUMINIUM FRAMED SLIDING GLASS WINDOWS & DOORS

1. Use Sliding aluminum framed glass windows as per the plans and manufacturer's specifications for all the windows.
2. Provide glass door (half glass) with aluminum frame for the Office room

9 – MECHANICAL:

1. Plumbing: Design, installation and testing of plumbing systems to include water and sewerage shall conformed to the required standards.
2. Mechanical Ventilation and Fire protection: Design and installation of a required number and size of Exhaust Fans (extractors), and the Fire protection system (smoke detectors, fire extinguishers, fire hydrant...) in compliance with the required standards

10 – ELECTRICAL

A specific electrical study shall be made in coordination with the contractor in charge of the AC Test Facility chamber to:

- Provide the new building with a suitable independently metered Electricity Supply
- Ensure the lighting level required as per code standard.
- Ensure sufficient electrical services distributed throughout the building for the equipment in use. (Adequate service points for services such as electricity, telephone and data shall be installed to facilitate flexibility)
- Provisions will be included to facilitate integration of photovoltaic panels into the building electrical system.

11 – FINISHES

- A. TILING
Provide heavy-duty industrial floor tiles for the main hall, porcelain stoneware floor tiles for the other floors, and ceramic wall tiles for toilets
- B. PAINTING:
Unless specified as one coat or two coat systems, each paint system consists of at least 3 coats comprising priming coat and 2 top coats.

CLIENT:  Millennium Development Authority <small>Research, Development and Technology Institution</small> 4th Floor, Heritage Tower, Liberation Rd Ridge West, Accra GHANA	OWNER:  GHANA STANDARDS AUTHORITY Gulf Street, Accra GHANA	PROJECT: AC Test Laboratory Building	ARCHITECT: Juste G. Kodja	REVISIONS:			Project number:	Sheet Title:
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LOCATION: Okponglo Greater, Accra-Region GHANA				ENGINEER:	Checked by:		Sheet number: A12.b	
				Date: April 2019		Scale:		

Electrical Service Design Concept for AC Test Laboratory Containment Building

Method for concept design

1. Establish the necessary capacity

Containment Building Capacity (316.61 m² area) = 3.52 kW (Hall) + 0.33 kW (Stairs) + 1.12 kW (Changing room) + 4.97 kW (Office) + 0.87 W (Toilet) = **10.81 kW**.

The calculation details are below:

- Hall (245.74 m² area):
 - Equipment's: No equipment needed.
 - General Lighting:
 - Lighting Power Densities (LPD) = 6.24 W/m² according to the ANSI/ASHRAE/IESNA Standard 90.1-2010;
 - Plug and Process Load (PPL) = 8.07 W/m² according to the ASHRAE 90.1-2004 Requirements.
 - Total per square meter = 14.31 W/m²
 - **Total Hall Capacity = 3.52 kW**
- Stairs (21.16 m² area): Stairs are opened on the hall area.
 - General Lighting:
 - LPD = 7.43 W/m²
 - PPL = 8.07 W/m²
 - Total per square meter = 15.5 W/m²
 - **Total Stairs Capacity = 0.33 kW**
- Changing room (6.96 m² area):
 - Heating: 0.5 kW (70 W/m²)
 - Cooling: 0.5 kW
 - General Lighting:
 - LPD = 9.36 W/m²
 - PPL = 8.07 W/m²
 - Total per square meter = 17.4 W/m²
 - **Total Changing room Capacity = 1.12 kW**
- Office (33.20 m² area):
 - Heating: 2.3 kW
 - Cooling: 2 kW
 - General Lighting:
 - LPD = 11.95 W/m²
 - PPL = 8.07 W/m²
 - Total per square meter = 20.2 W/m²
 - **Total Office Capacity = 4.97 kW**

- Toilet (9.55 m² area):
 - Heating: 0.7 kW
 - Ventilation: Natural ventilation.
 - General Lighting:
 - LPD = 9.36 W/m²
 - PPL = 8.07 W/m²
 - Total per square meter = 17.4 W/m²
 - **Total Toilet Capacity = 0.87 kW**

AC Test Unit Total Capacity (150 m² area) = 0.32 kW (Blower) + 35 kW (Air cooler) + 18 kW (Heater) + 12 kW (Humidifier) + 110 W (Psychrometer) + 2.92 kW (LPD) + 1.21 kW (Plug and Process Load) = **69.56 kW**.

Total Load = Containment Building Capacity + AC Test Unit Total Capacity = 10.81 kW + 69.56 kW = **80.37 kW**

2. Design concept

The necessary amperage of the main entrance (440V, 3 ph.) is: $I = P/V.\sqrt{3} = 80.37*1000/440.\sqrt{3} = \mathbf{105 \text{ Amp}}$. It is necessary to provide a 30% additional power as a safety protection for equipment's.

With the additional 30%, the necessary amperage of the main entrance will be **146 Amp**. Then, the main electric panel will have to be a **150 Amp electric panel (440V, 3 ph.)**.

Possibility of expansion: The input wiring will be sized to allow a 50% increase in capacity. The electric panel and protections will be based on the current calculated capacity.

The main electrical panel will be divided into several circuits: 1 for 440V equipment in the air room calorimeters and another for a 240V transformer. A secondary panel (single phase) will be installed from the 240V transformer for lighting and load circuits with 240V outlets

Main electrical panel (440V 3 ph): **150 [Amp]**

Breaker for balanced air room calorimeters equipment's and 1 circuit to 240 V transformer:

- 440 V circuit: Blower equipment: **[Amp]**
- 440 V circuit: Air cooler equipment: **[Amp]**
- 440 V circuit: Heater equipment: **[Amp]** (Is the heater electric?, Is there heating?)
- 440 V circuit: Humidifier equipment: **[Amp]**
- 440 V circuit: Process equipment's: **[Amp]**
- 440 V circuit: To subpanel 120-208: **[Amp]** (corresponds to the subpanel load + 30%)

Panel 240: Light and Load Circuits Encountered

- 240 V Circuit: Lighting **[Amp]**
- 240 V circuit: Charges to the jacks **[Amp]**